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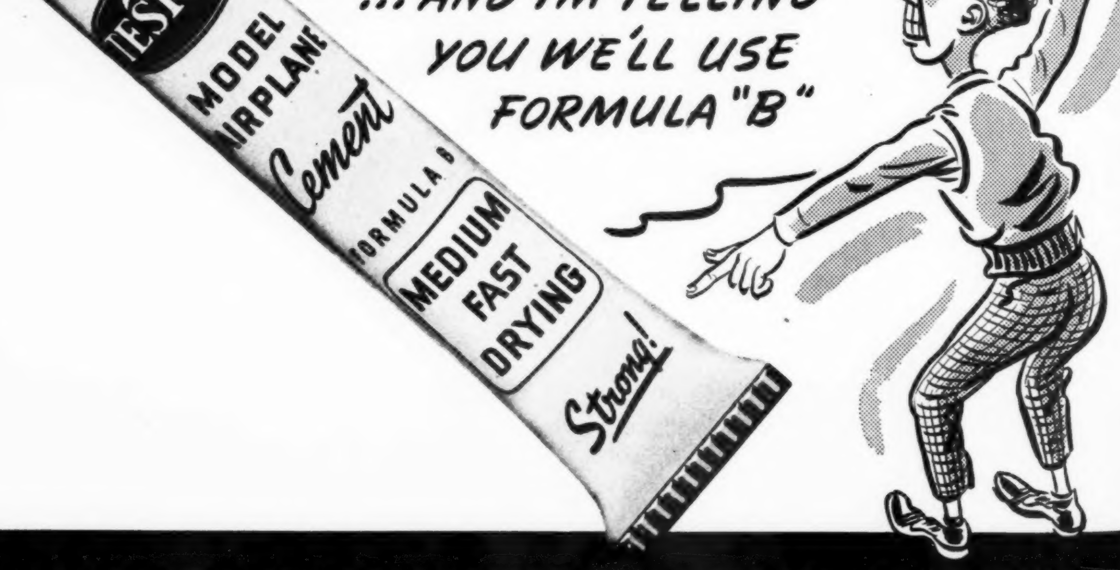


TESTOR CHEMICAL COMPANY • ROCKFORD, ILLINOIS

MODEL AIRPLANE NEWS

JAY P. CLEVELAND
Publisher

Serving Aviation 19 Years

JUNE 1948 VOL. XXXVII—No. 6

FIRST OPERATIONAL carrier jet fighter has successfully completed its initial carrier qualification trials. The North American FJ-1 *Fury*, 30 of which are in production for the Navy, has been assigned to famed squadron VF-5A aboard U.S.S. *Boxer*. Although not the first jet airplane to fly from a carrier (the DeHavilland *Vampire*, McDonnell *XFD-1* and Lockheed *P-80* in that order have accomplished the feat) the *Fury* is world's first carrier jet fighter in actual squadron service assigned to a fleet unit. The stubby 550 mph fighter is powered by a GE-Allison J-35 (TG-180) turbojet engine of 4000 lbs. thrust and features a "kneeling" nose wheel to permit carrier deck warmup with tail high in the air.

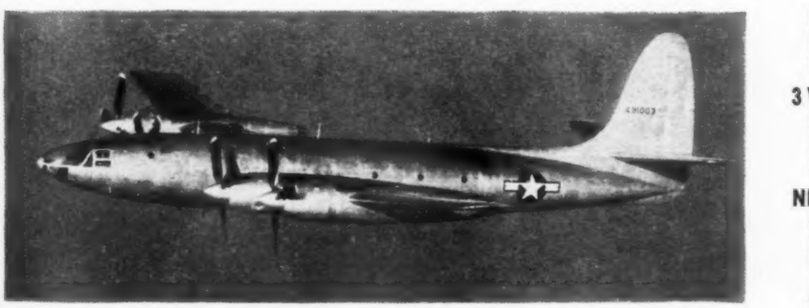
CURTISS-WRIGHT XP-87 all-weather fighter got away on its first test flight at Muroc Air Force Base, Calif., with complete success. Biggest fighter now under development, the giant four-jet craft weighs almost as much as a *Flying Fortress* without its bomb load. Test Pilot Lee Miller was so pleased with the craft that he remained aloft nearly an hour on this highly critical first test flight. The XP-87 has 60 ft. span, is 65 ft. long, stands 20 ft. high. Featuring side-by-side seating for its crew of 2, the huge craft is slated for quantity production at C-W's Columbus, Ohio Airplane Division plant.

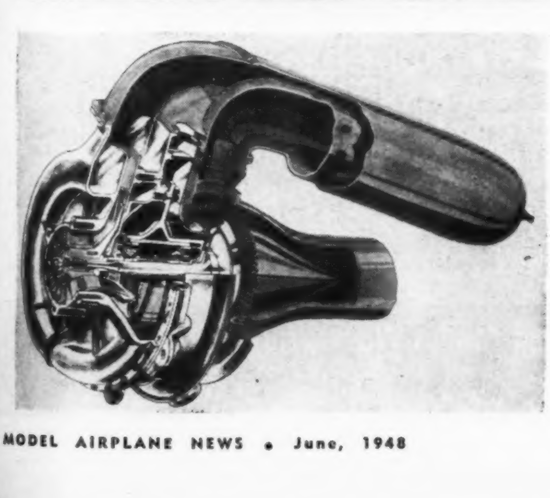
WORLD'S ALTITUDE RECORD has finally been broken after withstanding assaults for nearly a decade. A British DeHavilland *Vampire* has climed to well over 59,000 ft., surpassing former record of Italy's Mario Pezzi, set in 1938, by better than 3,000 ft. The *Vampire* is powered by a DeHavilland Ghost turbojet engine and is in standard service in several nations' air forces. British also captured 100-kilometer closed course speed record with 564.8 mph performance by prototype Vickers *Attacker* jet fighter.

NORTHROP AIRCRAFT received a contract from the Air Force for production of 23 "Pioneer" tri-motor transports. The military version, known as C-125, will feature a new tail configuration following loss of the protype due to tail failure. 13 of the type will be assault transports and the remaining 10 equipped with ski gear for Arctic rescue operations. The C-125 will be known as the Northrop *Raider* and production will get under way immediately.

WRIGHT AERONAUTICAL CORP. revealed its long awaited "compound" engine: a standard R-3350 *Cyclone* with turbo-supercharging equipment geared directly back into the crankshaft. The engine's normal 2500 hp rating is increased to better than 3000 hp, and its fuel consumption reduced considerably. Idea of the compound engine originated from fact that more exhaust pressure is furnished typical turbo-supercharger than it actually needs for its air compressing job, the remainder being wasted. By gearing the turbo directly back into the engine (instead of allowing it to run free and separate from the engine) this waste energy is applied directly to pro-

(*Turn to page* 65)





(Above) One of the most beautiful ships now flying, the Republic XF-12, will be tested as photo-reconnaisance plane for the Air force, which now has two of these 50 ton, 450 mph craft. (Below) Cheap expendable turbo-jet engine has been developed for use in Navy target drones, utilizing war surplus turbo-superchargers with single combustion chamber added. This 181 lb. powerplant produces 214 lbs. static thrust at 26,000 rpm and has been found ideal for the drones

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Cover Design by Jo Kotula

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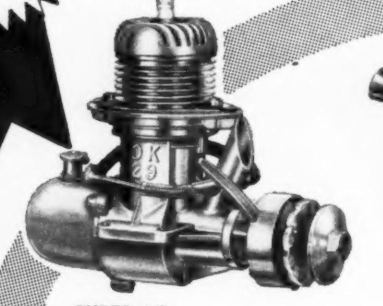
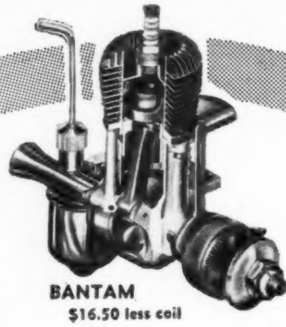
"O.K." Consistent Winners



SUPER 29
$16.50 less coil



BANTAM
$16.50 less coil

CO_2 IGNITIONLESS
$4.95 with holder

SUPER 60
$18.00 less coil

There must be a reason for the consistent appearance of the "O.K." name in AMA Record Report Forms . . . and there is! "O.K." has been making miniature engines for more than ten years. These years of experience have taught them how to build maximum performance in every engine they produce. Yet durability, fast starting and ease of operation have never been sacrificed to achieve it. Whether you are building your model for contest work or just for the fun of building and flying, look to "O.K." for all around top performance and satisfaction.

TWIN
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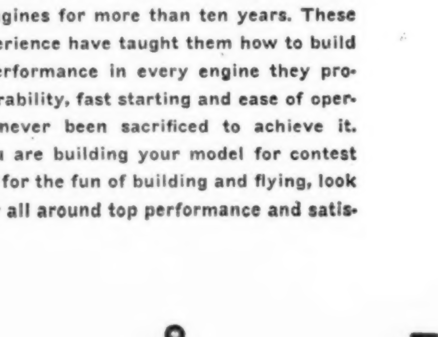
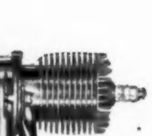


HOT-HEAD $12.50
less Glow Plug

SPECIFICATIONS

Model	Displ.	Bore	Stroke
Bantam	.199	.656	.590
Super 29	.299	.760	.660
Super 60*	.604	.900	.950
Twin	1.208	.900	.950
CO_2	.0178	.275	.300
Hot-Head	.299	.760	.660

*Super 60 also available in Raceway-Marine model equipped with flywheel. Price $23.00 less coil.



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SCRAP BOX

By BILL WINTER

RAY ARDEN asked us how fast we had heard an engine turn up. We said 12,000-15,000 was about the best we'd heard. Ray soon had a fly-wheeled .199 screaming at 22,000. Now we've been in a small room with two .50 guns on test and a prankster once stood us within a few feet of the tail pipe of a Navy pulse jet that started up, but brother that little .199 was in the same class. And Arden thinks 30,000 rpm is in the books. But he doesn't like the idea and neither do we. Those are turbine speeds, and some speed demon is going to be perforated, but for good, if U-control continues its present trend. Speeds are going beyond 150 mph, and 200 mph is now considered a possibility.

We do admire the science that our better builders have made out of speed, but it is like admiring the work of the nuclear physicists. H. A. Thomas sends us a diagram of a new type cylinder cowl which takes advantage of the fact that the slipstream twists behind the propeller. The air is scooped in through a slit, not in the middle front of the cowl, but at a point about 45° around the nose to the left, then swirls through a kind of reversed curved passageway (like the letter S) and exhausts out the right side of the cowl toward the rear. The rear of the cowl is a knife edge. You've got to take your hat off to these fellows. Nevertheless, we think the super speed model, flown by the super expert, is getting a little silly. For future safety, the good of speed, and of modeling in general, speed should be given back to the boys. We don't mean to penalize the good designer for, if he is really smart, he'll stay out front. But many a good flier comments that speed is no longer for him. It has got to the point where you have to be a physical marvel. That's where we think a mistake creeps in. Frankly, we think rules should be so shaped that the airplanes should go maybe 125 mph tops. Okay, call us a reactionary. Hope you go 500 mph.

Gordon Light once suggested that a model be judged on the ratio of its maximum and minimum speeds. This isn't offered as a suggestion but it does indicate the wide range of possibility. Speed range is one yardstick of judging a ship's efficiency. It would require plenty of thought and resourcefulness to design a ship that would fly at, say 25 mph and at the same time be capable of 120 mph.

Speaking of records, a fistfull of new marks have been set since the last issue. Oddly enough, all of them were made on a single day (February 29) at points as widely scattered as San Francisco and Knoxville, Tenn. At Knoxville, Tom Trent Jr. got up to 119.95 mph in Class B Open. (We love that ".95" for the human brain takes 1/5 second to react; who is kidding whom with 1/100 second stop watches?) Of original pod-and-boom design, Trent's ship was 16-1/2 in. long, spanned 16 in. and was powered by a *McCoy 29*. In Class A Open at the same contest, John Kasserman did 97.47 with a *Bantam*-powered original. Span 18 in., length 17 in. At the San Francisco Cow Palace—and where did they get that name?—two new glider records: one, Class B Jr. by Einar Eneveldson for 48.4 sec.; the other, Class B Sr. by Angelo Lo Castro, for 57.8 sec. Eneveldson's ship

(Turn to page 44)

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SPECIFICATIONS: .29 cu. in. displ. weight 4¼ ozs. Class B, AMA Rules

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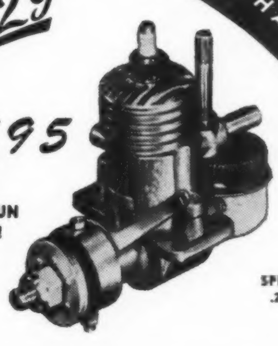
The Genie 29 has been developed by our staff — men with 15 and 20 years' experience — to give you a low-priced engine that incorporates the features of the highest priced engines available today plus additional features found in no other engine! No expense has been spared to make the Genie 29 an engine you can depend upon for *fun in flying*. High pressure Doehler-Jarvis die-castings, genuine silver contact points that eliminate pitting. Beryllium copper breaker point spring for smooth, constant operation, a transparent fuel tank and a gauge to estimate running time, chromium wearing surfaces, pressure lubrication of the piston and crankshaft, a Champion spark plug — all these features and many others make the Genie 29 the *best buy at any price!*

Genie 29

$6.95

READY TO RUN NOT A KIT!



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WEST COAST TIPS

by JOHNNY DAVIS

WE have read quite a bit about the "Friendship Train" and all the other "Trains" which have been carrying gifts of food, clothing and other essentials of life, liberty and the pursuit of hoppiness to the hard-pressed people of Europe; but as far as we have been able to find out no one has given a thought to the other hours, when the kids of Europe have been fed and clothed; what can the youngsters do to amuse themselves? It would be a shame to send all that food, etc. over to where it is needed if, after the kids are through thanking everybody, they go outside and practice the "goose step" or a "raised fist" salute.

We were fortunate (or unfortunate, depending on the point of view) to have had a chance to see what the people are like over there, and taken by and large they are much the same as people over here except that they don't seem to have as much to do, and as a rule there is plenty of idle time. Because of this, there are more community gatherings where the topic of the day is discussed. (If they live on the right side of Europe's "tracks.") These meetings are wonderful places for the dictators to push their ideologies since they almost always promise some thrill in place of the utter boredom usually prevalent.

All of this preamble is leading up to a very simple statement:

Why not have a Friendship "Model" Train?

Almost everybody we know has some old broken down engine or an old tool box, or some gadget, maybe just a bunch of plans, old magazines, something that has to do with the model hobby. Something that could be fixed up easily and joined with a lot of other odds and ends could be sent to the fellows just like yourself on the other side of the water—fellows who are just praying for the day when they will be able to lay their hands on a real honest-to-goodness gas engine, not some hand-made diesel job that is worth three months of the president's pay.

Can you imagine what those fellows would do if they could see one of these new *Ohlssons, McCoys, O.K.s,* or *Cyclones,* to name but a few! It would be a dream come true.

How would you like to build an airplane out of pine (the whole ship) and then try to fly it with a diesel turning all of 3000 rpm. If it got off the ground at all, it wouldn't get very high, to say nothing of the flight itself. No high screaming climbs! No spectacular spirals (also no screaming *dives,* better put that in).

Anyway, you get the idea. We think that old Uncle Sam would appreciate our doing our part, too. Model aviation has done a lot for the kids of America! Let's let model aviation help save the Peace!

The easy way to do this, and the quickest, would be for clubs to do the collecting job and hold the supplies until a central agency can be called in to help get it ready. Perhaps the AMA could be persuaded to act as the official clearing house since it is the recognized voice of model aviation in America. This is just thinking out loud, please understand. The need is great, and the cause is fine. Nobody should mind helping. The friendship and good feeling generated is bountiful return for an old engine and a couple of props.

Well, there's the pitch! What do you say?

* *

While on the subject of Good Will, we wish to mention another "tour" that will be welcomed this summer. Messrs. Irwin G. Ohlsson and Harry T. Rice are planning a wee trip with their "O & R Express," known in other circles as a *DC-3*.

So far the actual itinerary of this flight is not positive, but it will include Mexico City, Guadalajara, Acapulco, Monterey, and other points south of the border.

Purpose of the trip will be to introduce model aviation at its best to the Mexican populace. The participants of this luscious trip are to include 10 of the best control-line and free flight men that "Oley" and Harry can find!

Bob Keech, winner of Junior Speed event at last *All-Western,* receiving his scholarship from Union Oil Co. representatives. Bob is favored to win again this year

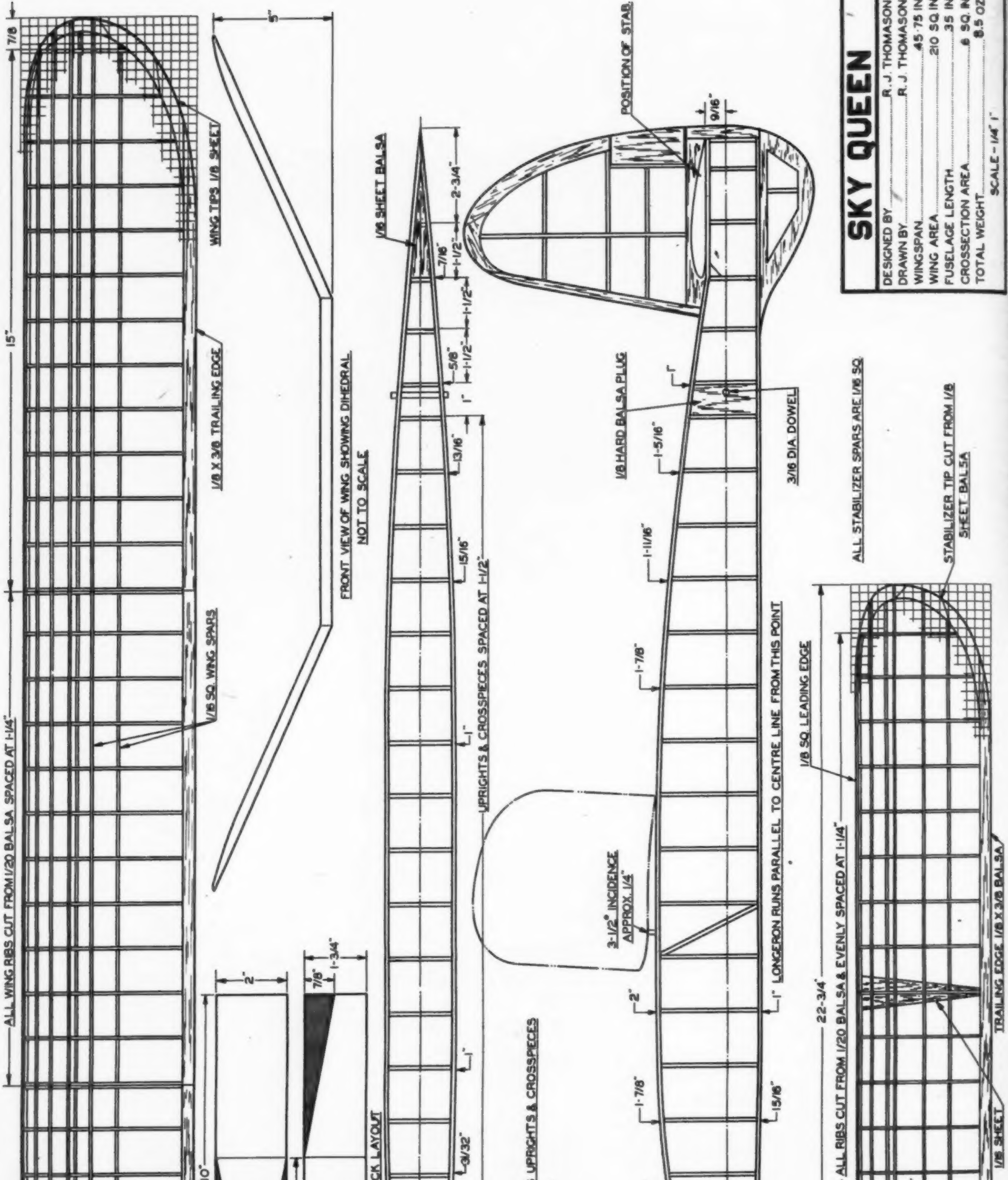
All expenses will be paid on the trip, and if we know the O & R team those who go will really go first-class. Naturally, everybody will use *O & R* engines on the trip, furnished by the factory, since this will be in a sense an advertising stunt. However, the whole industry will reap a reward if Mexico is stirred up sufficiently to become model airplane "happy."

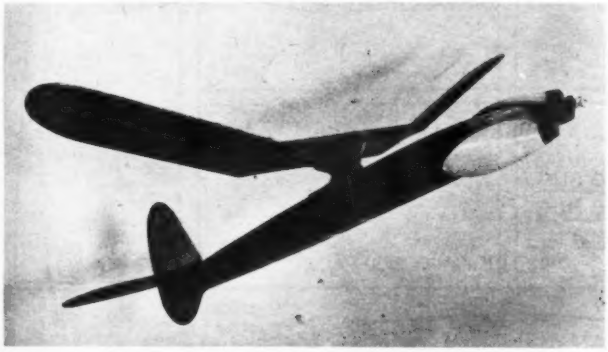
* *

Received another letter from Roy Bitters, Fresno's A No. 1 model airplane builder and letter writer. He says: "Here's some hot news that will help put Fresno on the map as the place to go. A.M.A.-sanctioned record speed runs, second Sunday every month, Hornet Hobby Park, Church and Chestnut Ave., 10:00 a.m. to 4:00 p.m. A

(*Turn to page 36*)

Newberger and Sharp with their "Canned" series of all-metal ships


SKY QUEEN
DESIGNED BY R. J. THOMASON.
DRAWN BY R. J. THOMASON.
WINGSPAN 45·75 IN.
WING AREA 210 SQ. IN.
FUSELAGE LENGTH 35 IN
CROSSECTION AREA 6 SQ. IN
TOTAL WEIGHT 8.5 OZ.
SCALE - 1/4" 1"
1/8 SQ. BALSA
ALL WING RIBS CUT FROM 1/20 BALSA SPACED AT 1-1/4"
1/8 SQ. WING SPARS
1/8 X 3/8 TRAILING EDGE
WING TIPS 1/8 SHEET
15"
10"
7/8
5"
FRONT VIEW OF WING SHOWING DIHEDRAL
NOT TO SCALE
PROPELLER BLOCK LAYOUT
2"
1-3/4"
7/8"
4-3/8"
1-1/4"
27/32
5/8
ALL FUSELAGE LONGERONS UPRIGHTS & CROSSPIECES
ARE 1/8 SQ. BALSA
1/8 SHEET BALSA
UPRIGHTS & CROSSPIECES SPACED AT 1-1/2"
2-3/4"
1-1/2"
7/16"
5/8"
13/16"
15/16"
1"
31/32
5/8"
1-1/4"
POSITION OF STAB.
9/16"
1/8 HARD BALSA PLUG
3/16 DIA. DOWEL
1-5/16"
1-11/16"
1-7/8"
1" LONGERON RUNS PARALLEL TO CENTRE LINE FROM THIS POINT
3-1/2° INCIDENCE
APPROX. 1/4"
2"
1-7/8"
15/16"
1-1/2"
7/8"
1-1/4 X 1-1/2 X 1 NOSE BLOCK
7/8"
5/8"
ALL STABILIZER SPARS ARE 1/16 SQ.
STABILIZER TIP CUT FROM 1/8
SHEET BALSA
1/8 SQ. LEADING EDGE
22-3/4"
ALL RIBS CUT FROM 1/20 BALSA & EVENLY SPACED AT 1-1/4"
TRAILING EDGE 1/8 X 3/8 BALSA
1/8 SHEET
1-5/16"
3-7/8"



by ROY THOMASON

MOST model builders who look back over their years of contest flying can recall one model, or a series of models based on one design, that they usually refer to as the "Old Reliable" or "Old Standby." Such is the model presented here.

The original *Sky Queen* was built during the summer of 1938. Since that time, 8 models have been built and flown, including a 300 sq. in. job. Its contest record of 3 first and 3 second places can be attributed to its outstanding climb, and the ability to drift slowly in a high wind. It should be remembered, however, that although a terrific climb is an asset to contest models, it has in many cases been their downfall. During the 1940 Canadian Nationals a 20 mph breeze fanned the field; in spite of better judgment, we decided to fly. 800 turns were packed into the motor, and the model was sent on her way. Within a few seconds she was a mere speck in the sky, and before we ran 200 yds. had passed out of sight. So use a little caution and common sense when adjusting your *Sky Queen* for climb.

The pylon shown in the photos was originally intended for fair weather flying, but was discarded after proving itself unsatisfactory.

It may be advisable at this time to mention the flight times of both the *Sky Queen* and its 300 sq. in. version. The high single official flight time of the *Sky Queen* is 9 min. o.o.s., official, 3 flight average 4 min. 56 sec. The 300 sq. in. job has one official flight of 8 min. 43 sec., o.o.s. but continued on its merry way (9 miles of it) for 4 hours, finally landing in front of a construction camp office.

Before starting actual construction, scale up the accompanying drawings to their proper size.

FUSELAGE—The fuselage is built of ⅛" medium hard balsa. Build the side frames, one atop the other, extending the longerons approx. 1" beyond front and back end of the fuselage. These may be trimmed off just before the sides are removed from the building board. All crosspieces of the same length for the center of the fuselage should now be cut and cemented in place. When the cement is reasonably dry, the tail is joined together, along with the first crosspiece at the nose. All remaining spacers may be cemented in position. When the entire structure is dry, put in the ⅛" hard sheet balsa at the

(*Turn to page* 61)

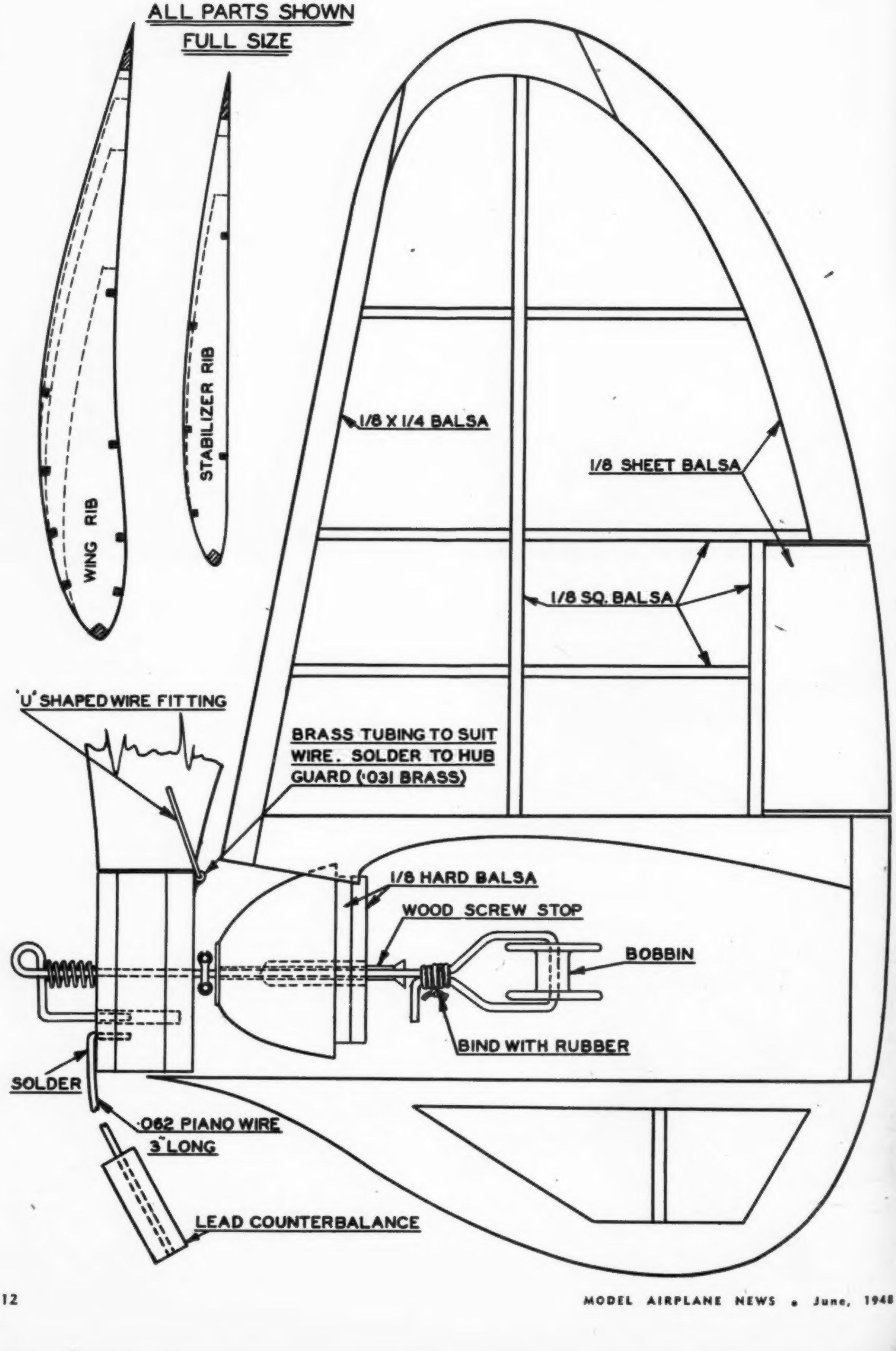

ALL PARTS SHOWN
FULL SIZE
WING RIB
STABILIZER RIB
1/8 X 1/4 BALSA
1/8 SHEET BALSA
1/8 SQ. BALSA
'U' SHAPED WIRE FITTING
BRASS TUBING TO SUIT
WIRE. SOLDER TO HUB
GUARD (·031 BRASS)
1/8 HARD BALSA
WOOD SCREW STOP
BOBBIN
BIND WITH RUBBER
SOLDER
·062 PIANO WIRE
3" LONG
LEAD COUNTERBALANCE

Fig. 1 V-4 motor with gas generator was made in Japan

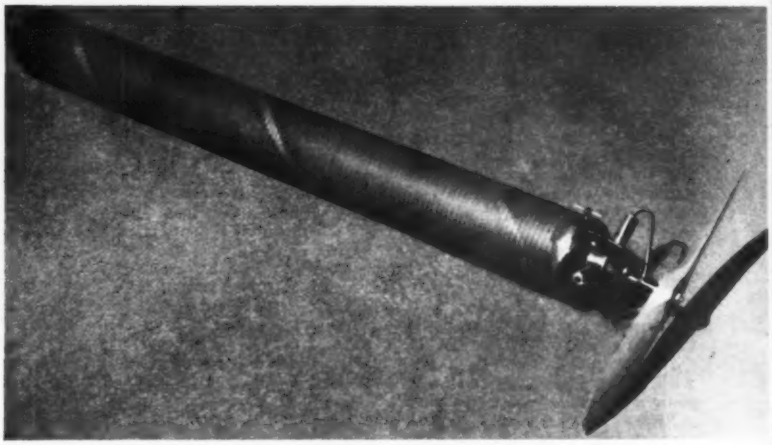


Fig. 2 Compressed air plant offered clean, quiet power but took lots of pumping

Expansion Engines

Fig. 3 Business end of successful steam-powered controlliner

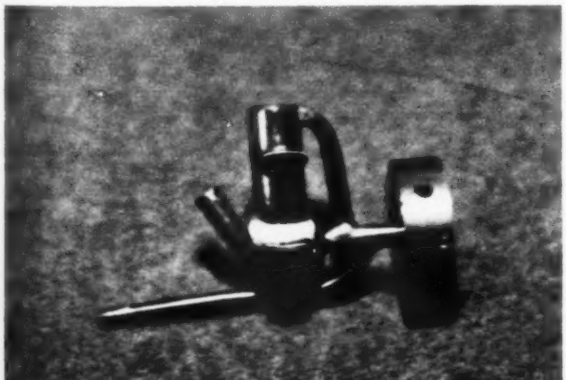


Fig. 4 The author's version of a "hot" compressed air engine

By ROY L. CLOUGH JR.

The author feels these power units have been neglected —get busy, experimenters!

THE re-introduction and acceptance of expansion engines as model airplane powerplants must bring a definite "I told you so" grin to the faces of oldtimers. For here is a category of prime mover sadly neglected up to now by builders and manufacturers alike, yet which is in many ways more suited to free and controlled flight than the presently popular gas and diesel engines.

At this writing there are 2 expansion engines on the market, both CO2 powered. Their quiet operation, non-existent starting troubles, reliability and cleanliness are appealing to many.

Expansion engines are those in which the gases which drive the piston are brought in from an outside source instead of being generated in the cylinder. Engines of this type were the first dynamic powerplants used in model planes. They fall into 2 main categories: *reservoir* and *generator* engines. Reservoir engines operate from a tank or cartridge of compressed gas; generator engines from a generator or boiler which produces the energizing gas.

The small CO2 engines available today are reservoir engines. The performance of this type is similar to a rubber, or spring motor, the greatest thrust being exerted as soon as the propeller comes up to speed, with output continuously dropping off as the energy (temperature and pressure) of the gas decreases.

There are at present no generator engines on the market. An olden example of this type is shown in Fig. 1—the *Imp Tornado*, offered by International Models during the 30's. It was produced in 2 models, of 2 and 4 cylinders. One of the most powerful pre-gasoline powerplants, the *Imp* gave many a good flight to those who could find a convenient source of the dry ice propellant.

The engine in the picture is the 4 cylinder model. The cylinders are arranged in "Vee," 2 cylinders to a bank, with a slide valve for each bank which operates from a throw at the rear of the crankshaft. The engine is very lightly built of soft brass and light sheet steel stampings, soft soldered and bolted together. The pistons are a good fit and the crankshaft is a very neat job of precision bending. Provision is made to oil the slide valves through screw caps on each bank and the crankcase holds 1/2 oz. of 3 in 1 or mineral oil for lubrication.

The gas generator at the right is an ingenious mechanism. It requires small lumps of dry ice and carbide plus water to operate. It is designed to be removed from the plane for loading and cleaning and the feed line detaches from the tank for this purpose. Here there is some leakage in evidence. The inside of the tank is compartmented to hold the 3 requisite fuels. Water is used to heat up the dry ice to

cause it to evolve into gas, and the heat developed by the carbide added to the water prevents the water from freezing in the process. A dumping lever is used to bring the components together after which the gas is produced very rapidly.

Frankly, we never start this thing up without a bit of fear and trembling because we have heard of similar mechanisms exploding violently when overloaded. However, it does have ample power to fly a 6 foot model and is reliable and consistent in operation when one can obtain the all-essential dry ice.

The compressed air unit shown in Fig. 2 is typical of the engines of this type offered during the late 20's and early 30's. The tank is (apparently) phosphor bronze about .005" thick, and wrapped with .010" steel wire for extra strength. The ends are closed with .012" spun brass caps and a standard tire valve is used for inflation.

The motor, of the rotary valve type, is mounted to the tank with soft solder. This part of the unit is rather poorly constructed; a three-cylinder affairs, the crankcase is of spun brass, cylinders of brass tubing, slotted aluminum pistons with *leather* compression rings and the connecting rods are merely hard copper. The crankshaft is a 2 piece assembly with a machine screw crankpin. The fit between crankshaft and main bearing, which forms the rotary valve intake and exhaust arrangement, is very poor and leaks badly. Soft solder is used as an assembly medium throughout.

The tank, we discovered accidently, will hold 100 lbs. pressure safely—how much more is problematical. At this pressure the motor will swing a 12D 10P Pawlownia prop for 45 sec. The first burst of power when the valve is opened is rather surprising, but within 15 sec. the thrust begins to fall off rapidly. After 30 sec. the thrust is negligible. The efficiency of this engine is very low due to excessive leakage of the rotary valve; with the prop held still and the admission valve open a full tank of air will leak out in just under a minute!

In order to evaluate properly the worth of compressed air in an efficient engine we built a single cylinder, poppet-valve motor of .20 cu. in. displacement and with the above tank obtained runs of over a minute and a half with power output equal to the 3 cylinder engine originally supplied with the tank. With this arrangement mounted in a 48" span free flight job we obtained flights of 1000 feet and up, with 20 to 30 strokes of a tire pump. A relatively constant pressure supply to the engine was established by use of an Austin flight timer connected to gradually open the feed valve as the tank pressure lessened. We found best results came when the engine was made to carry as much propeller as possible, smaller props at high speed resulting only in a needless waste of pressure.

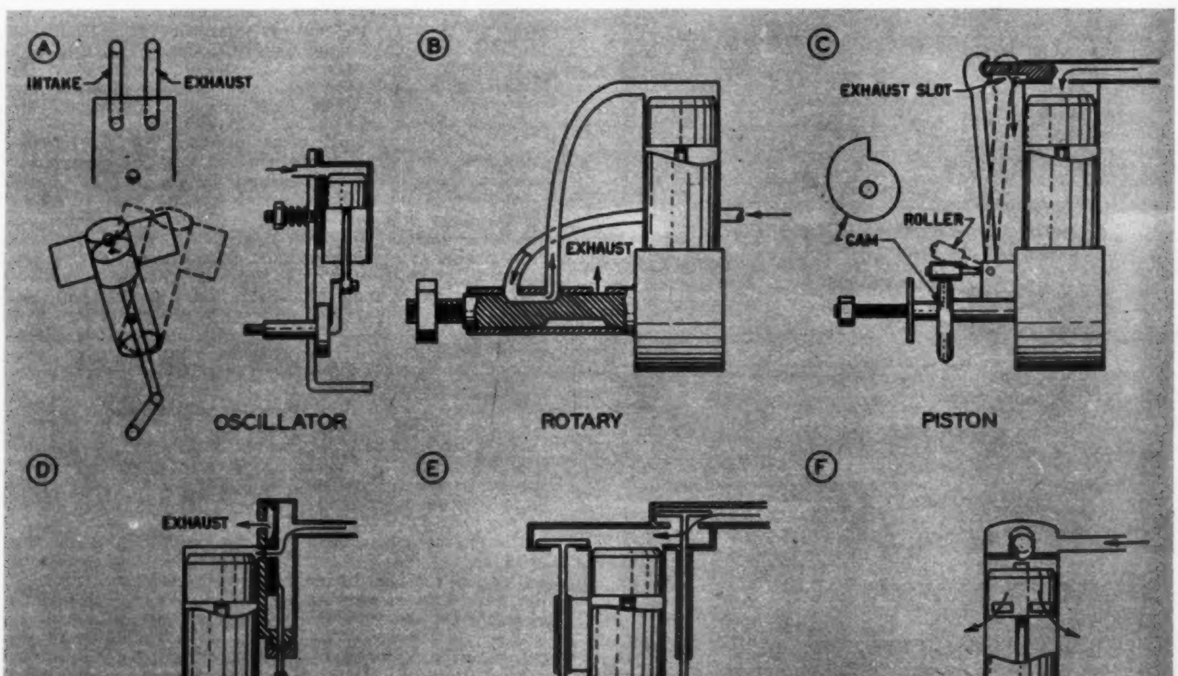
One of the most interesting expansion engine experiments made by the writer is shown in Fig. 3, a steam engine control line plane. The engine, boiler and burner are built as an integral unit which bolts to the front of the plane. About 4 min. is required to get up steam after which the burner is doused, refueled and relit for flight. This engine has never been checked with a Strobotac but the best estimate of its rpm would not be over 2000 on the ground. Thus the trick is to get it airborne, which requires a smooth takeoff surface and a bit of leading. Once in the air, however, the engine picks up and puts out enough power to fly the ship at about 40 mph on 20 ft. lines, without whipping. This is because of the small size of the burner and boiler which requires a considerable blast of air into the intake scoop to build up a good pressure. With naptha fuel the engine has quite a bit more pep, but since this soots up badly in the burner employed we have had to stick to denatured alcohol which burns cleanly.

The engine is an inverted oscillating cylinder type with a 1/2" bore and 3/4" stroke. It swings an 11 dia. 9" pitch balsa, or an 8-8 Pawlownia prop with about equal thrust output. A fairly heavy counterweight is used which makes operation nearly vibration-free. Weight (fueled and watered) is a shade over 8 oz. The boiler, incidentally, is stuffed with copper wool to prevent sloshing and improve thermal efficiency. A moulded asbestos cap, removed for the picture, keeps the slipstream from hitting the cylinder in flight; otherwise condensation of the steam would lower efficiency.

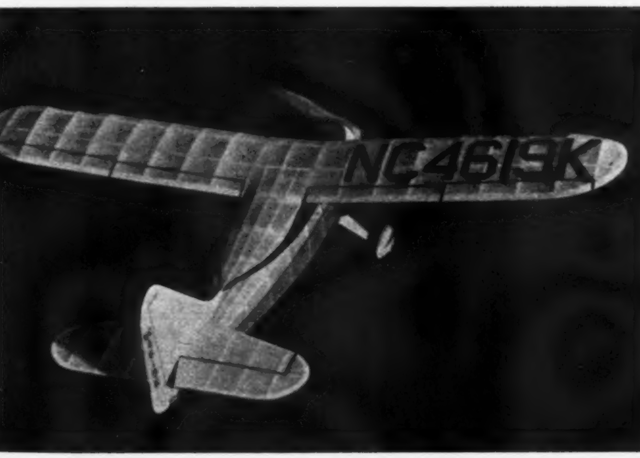
Fig. 4 illustrates an interesting but rather impractical experiment—a "hot" expansion motor, sort of a "McCoy" among compressed air engines. This develops more power than any of the other engines shown. It has 1/2" bore, 7/16" stroke and is constructed of hard brass tubing, except for the crankshaft which is steel. The piston is hand-lapped to fit and connects to the connecting rod with a ball and socket joint. Full counter-

(*Turn to page* 38)

Fig. 5 Below are shown six different valve mechanisms, applicable to various types of expansion engines



STINSON VOYAGER



by EARL STAHL

This scale job has CO2 power—you spend your time flying, not fussing

AMONG the fastest selling planes of the day are the well known Stinson *Voyager* and *Flying Station Wagon*. Reasons for this extreme popularity are numerous. Of all the larger personal planes they are among the least expensive to purchase and operate. Further, they can be flown with ease.

But probably the most important is their wide usefulness. With the ability to carry 4 passengers in comfort, or a pilot and a sizable quantity of cargo, they serve as family plane or business craft of great utility. As compared with some of its competitors, a Stinson is fairly slow since it cruises at close to 120 mph. Yet this is somewhat offset by the fact that it can be flown by pilots of limited experience into and out of any field that can be called an airport. This is not always possible, of course, for planes of higher stalling speeds and more critical flying qualities. In this connection the writer can volunteer the opinion, after flying *Voyagers*, that just anyone who can fly any other type of plane safely can master the Stinson with ease.

Our model is of the latest Stinson which features larger tail surfaces to enhance the plane's inherent stability. The *Voyager's* configuration lends itself well to the requirements of a good model, particularly one powered by an expansion-type reciprocating engine such as this one has. We used one of the Herkimer OK CO2 engines in the test ship and were highly pleased with the results.

Light weight, so long as it is consistent with strength requirements, is always important whether it be in the creation of a giant transport or bomber, or a mere model, and our *Voyager* is no exception. Since the carbon dioxide capsule and motor unit weigh considerable, the airframe must be fabricated with extreme care to keep the gross weight close to 5 oz.

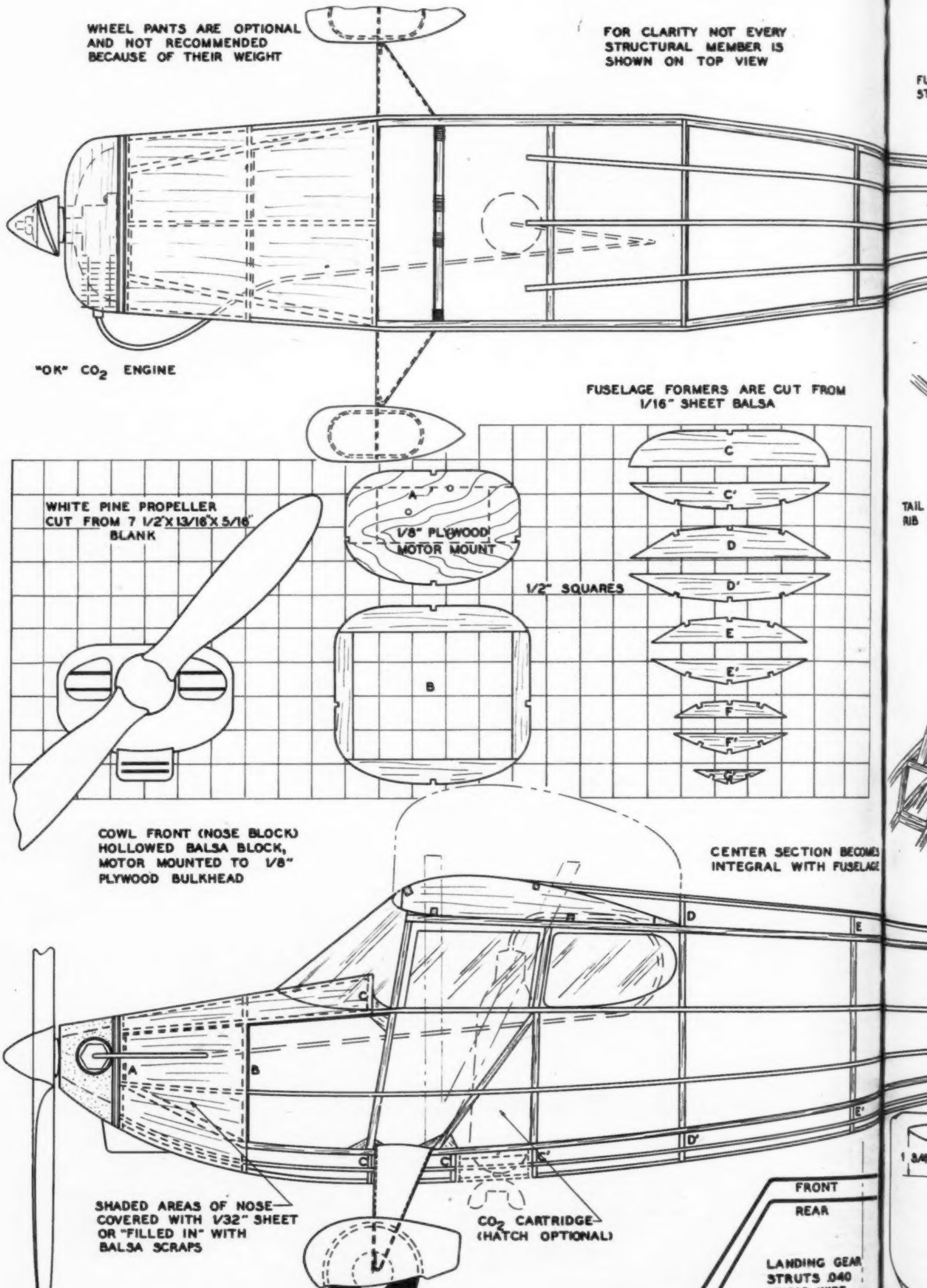
Construction of the model is really quite simple and no difficulty should be experienced if drawings are studied and the text read before starting. Balsa wood is used throughout and regular model airplane cement is the adhesive. You will want a model that is a treat to behold whether it is on the shelf or on the wing, so assure this by putting your best effort into the task.

Since assembly of most parts can be accomplished more easily over full size drawings, the magazine page layouts should be doubled. This is accomplished by stepping off each dimension twice using dividers. One-half inch grid is imposed over many of the curved parts to ease the job of enlarging them. (See articles on "Scaling Plans," Oct. and Nov. 1947, issues of M.A.N.)

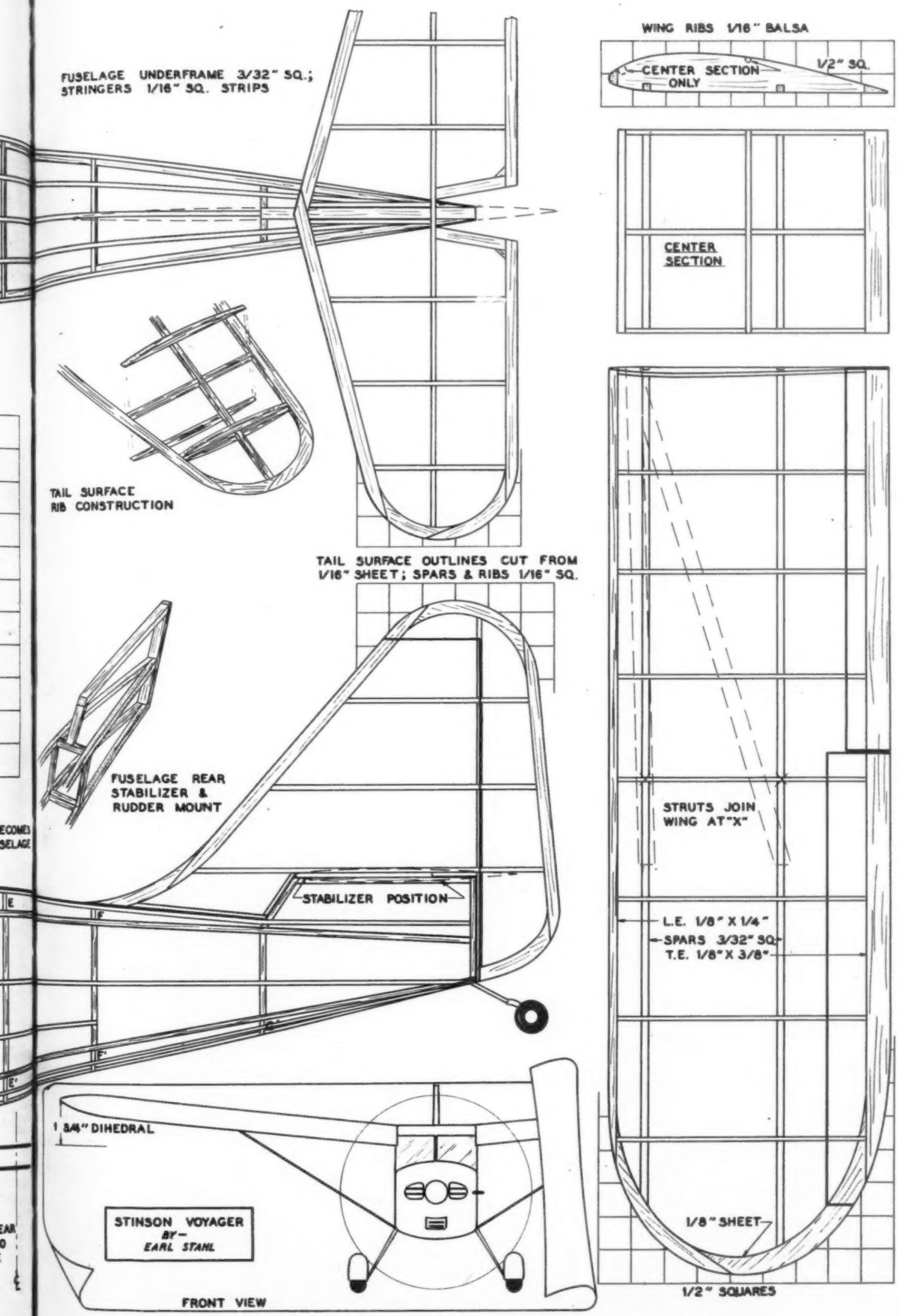
Construction is logically begun with the fuselage. It consists of an underframe about which formers and stringers are mounted to derive the scale appearance. Build the 2 sides of the underframe first from 3/32" sq. strips using the plan as an assembly jig. (The frame is shown lightly shaded.) Assemble these sides one atop the other and then, when dry, separate and rejoin them with 3/32" sq. members as indicated by top view. The mount for the stabilizer and rudder is shown in perspective and it must be placed with accuracy; material for it is hard 3/32" sheet cut into strips of the right width. Formers are cut from 1/16" sheet balsa and they are cemented to their respective positions.

Since the wing's centersection becomes an integral part of the fuselage, it should be assembled at this time and then attached to the fuselage. Just forward of bulkhead A is a 1/8" plywood bulkhead for mounting the engine; its shape is identical to A's. Drill mounting holes for the engine and firmly cement No. 3-56 nuts to the backs of the holes to enable installation and removal of the engine with greatest ease; cement the plywood mount firmly

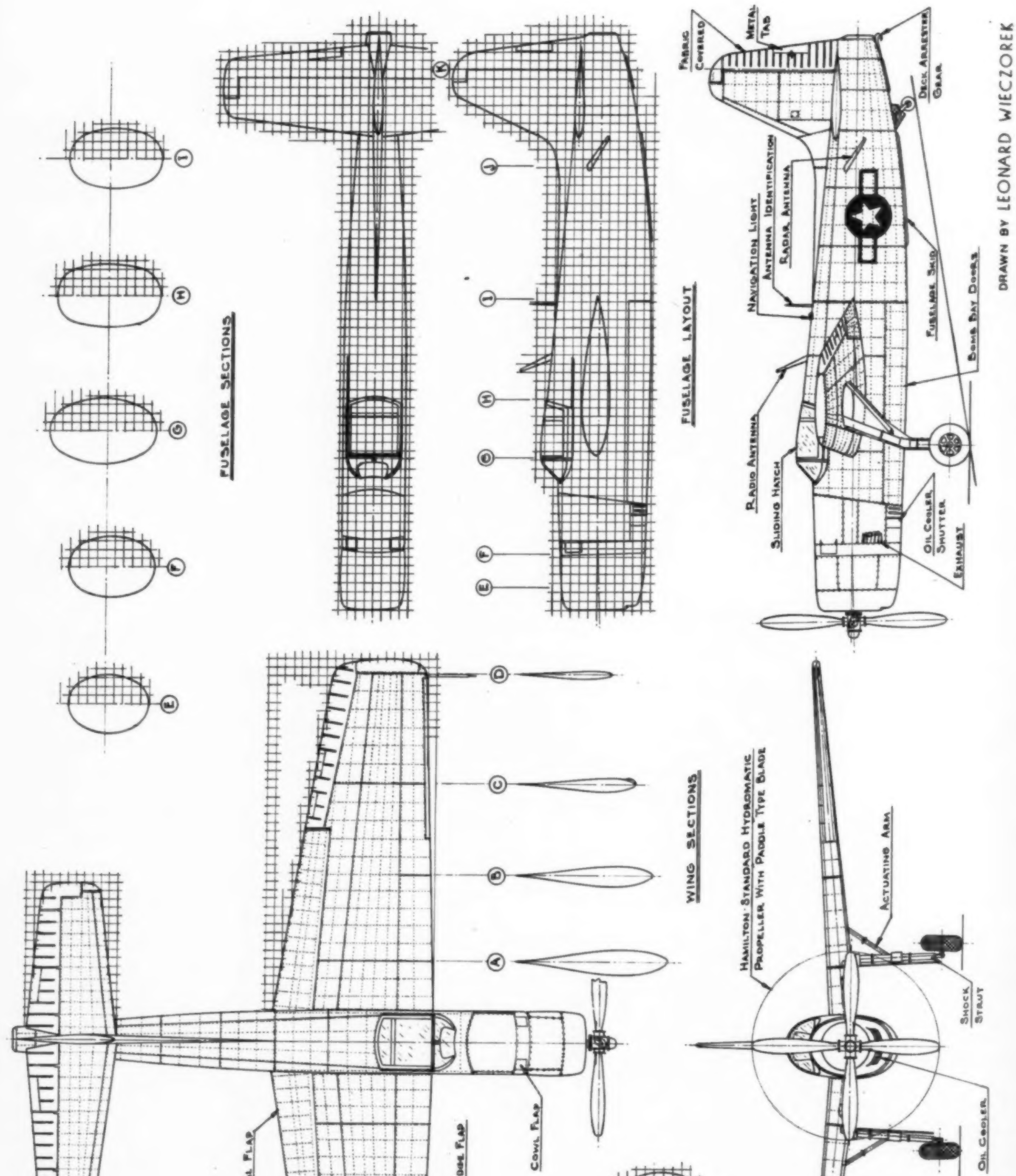
(*Turn to page* 41)



WHEEL PANTS ARE OPTIONAL AND NOT RECOMMENDED BECAUSE OF THEIR WEIGHT
FOR CLARITY NOT EVERY STRUCTURAL MEMBER IS SHOWN ON TOP VIEW
"OK" CO_2 ENGINE
FUSELAGE FORMERS ARE CUT FROM 1/16" SHEET BALSA
WHITE PINE PROPELLER CUT FROM 7 1/2" X 13/16" X 5/16" BLANK
1/8" PLYWOOD MOTOR MOUNT
1/2" SQUARES
A
B
C
C'
D
D'
E
E'
F
F'
G'
COWL FRONT (NOSE BLOCK) HOLLOWED BALSA BLOCK, MOTOR MOUNTED TO 1/8" PLYWOOD BULKHEAD
CENTER SECTION BECOMES INTEGRAL WITH FUSELAGE
SHADED AREAS OF NOSE COVERED WITH 1/32" SHEET OR "FILLED IN" WITH BALSA SCRAPS
CO_2 CARTRIDGE (HATCH OPTIONAL)
FRONT
REAR
LANDING GEAR STRUTS .040 MUSIC WIRE
BALSA WHEELS



FUSELAGE UNDERFRAME 3/32" SQ.; STRINGERS 1/16" SQ. STRIPS
WING RIBS 1/16" BALSA
CENTER SECTION ONLY
1/2" SQ.
CENTER SECTION
TAIL SURFACE RIB CONSTRUCTION
TAIL SURFACE OUTLINES CUT FROM 1/16" SHEET; SPARS & RIBS 1/16" SQ.
FUSELAGE REAR STABILIZER & RUDDER MOUNT
STRUTS JOIN WING AT "X"
STABILIZER POSITION
L.E. 1/8" X 1/4"
SPARS 3/32" SQ.
T.E. 1/8" X 3/8"
1 3/4" DIHEDRAL
STINSON VOYAGER BY— EARL STAHL
1/8" SHEET
1/2" SQUARES
FRONT VIEW


GRUMMAN
XTB3F-1
DRAWN BY LEONARD WIECZOREK
FUSELAGE SECTIONS
FUSELAGE LAYOUT
WING SECTIONS
FABRIC COVERED
METAL TAB
DECK ARRESTER GEAR
NAVIGATION LIGHT
ANTENNA IDENTIFICATION
RADAR ANTENNA
FUSELAGE SKID
BOMB BAY DOORS
RADIO ANTENNA
SLIDING HATCH
OIL COOLER SHUTTER
EXHAUST
HAMILTON-STANDARD HYDROMATIC PROPELLER WITH PADDLE TYPE BLADE
ACTUATING ARM
SHOCK STRUT
OIL COOLER
RADAR DOME
METAL FLAP
COWL FLAP
HINGED LEADING EDGE FLAP
PITOT STATIC TUBE
TRIM TAB
SERVO TAB

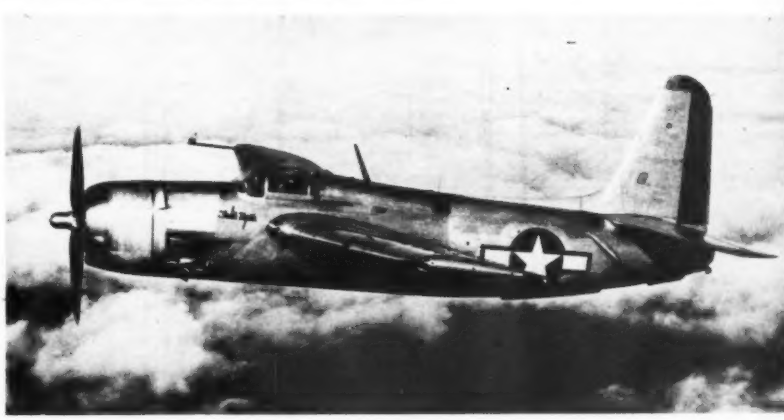
PLANE ON THE COVER STORY

Grumman XTB3F-1

by ROBERT McLARREN

IN the nearly 3 years since V-J Day both Air Force and Naval Aviation engineering officers have expended countless millions of man-hours examining the aircraft design lessons to be learned from the experience of World War II. Of equal or greater importance is their attempt to evaluate these lessons in terms of World War III; for it is their job to prepare for that war, whether or not it is ever fought. World War II produced innumerable detailed changes in the requirements for all types, but in only a few cases are these changes of major importance in design in the immediate future.

For example, the float equipped observation plane is out; the primary trainer has been removed from the list; and in general the "dual purpose" airplane has become a thing of the past in a new era of specialization. No longer will we see scout-bombers, torpedo-bombers, scout-observation, etc., types on the Navy list. And assuredly doomed is the battle scarred and valiant rear gunner on single engine airplanes.



This latter lesson loomed as early as 1943 in the Pacific theater and found its manifestation in a new crop of special purpose airplanes the Navy termed "attack" types, which replaced the torpedo-bomber and bomber-torpedo types. Entering the Navy's aerial arsenal even before the war was won was the new Douglas AD-1 *Skyraider* and the Martin AM-1 *Mauler*, both single seat craft, big as bombers, fast as fighters.

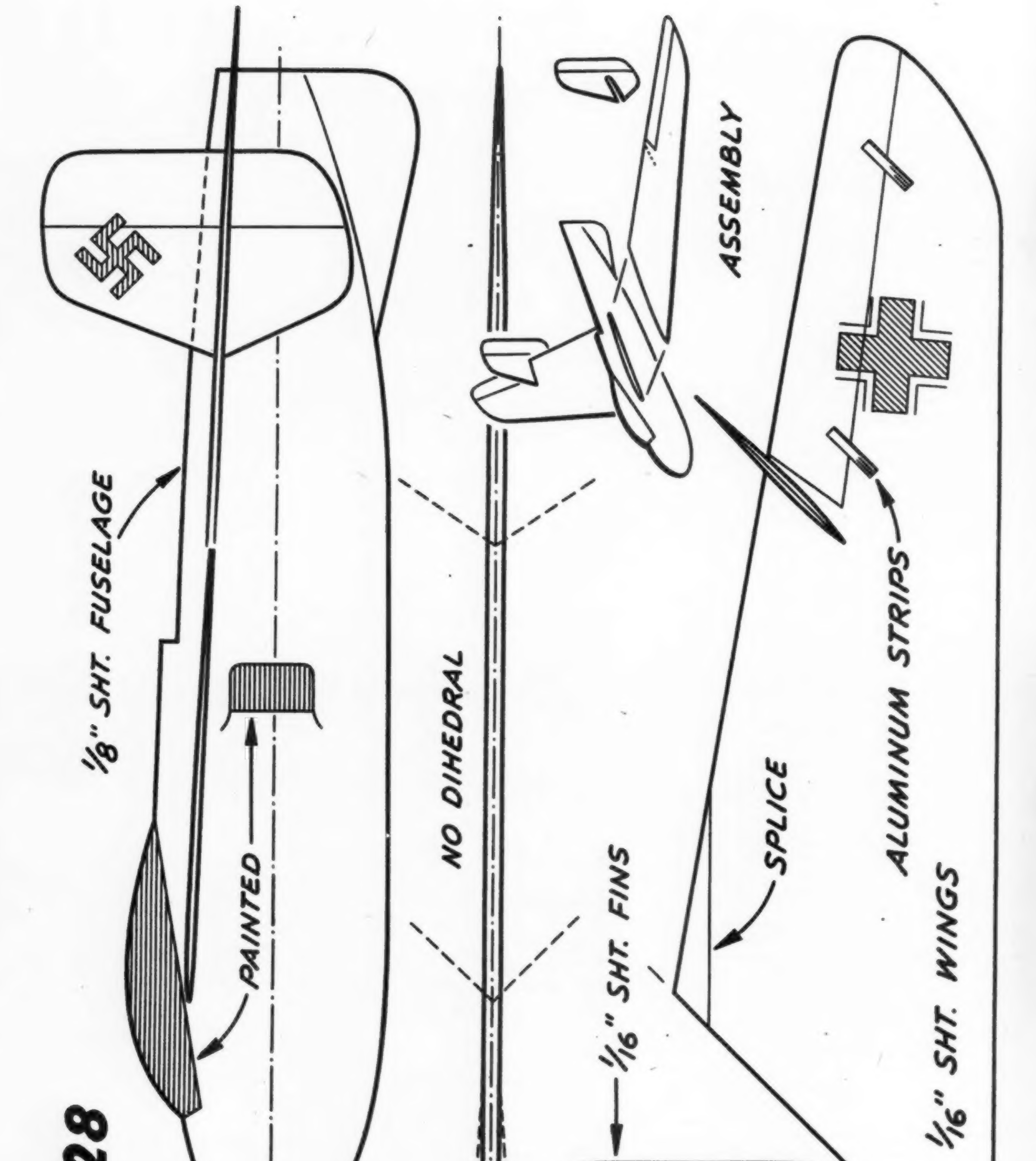
But greatest secrecy prevailed in the development of an even more radical attack plane, the Grumman XTB3F-1, our Plane on the Cover this month. Few airplane designs have undergone such rapid and extensive development as has this unique craft which even yet has not reached its final configuration. From countless hours of experience on the immortal Grumman TBF *Avenger* and the concentrated aircraft knowledge of dozens of Bureau of Aeronautics and Grumman engineers, an entirely new type of Naval aircraft was projected. Its layout was to solve simultaneously the past problems of the torpedo plane and to open up a broad new field in the different type: the all-weather combat airplane.

To overcome the basic problem of the torpedo plane—its slow speed in comparison with other types with the same power—the Navy sought to utilize a turbojet engine as a booster powerplant to provide quick takeoff and fast bursts of speed in emergencies, such as the pullup following a torpedo run on an enemy ship. To provide long range, however, a conventional reciprocating engine was specified.

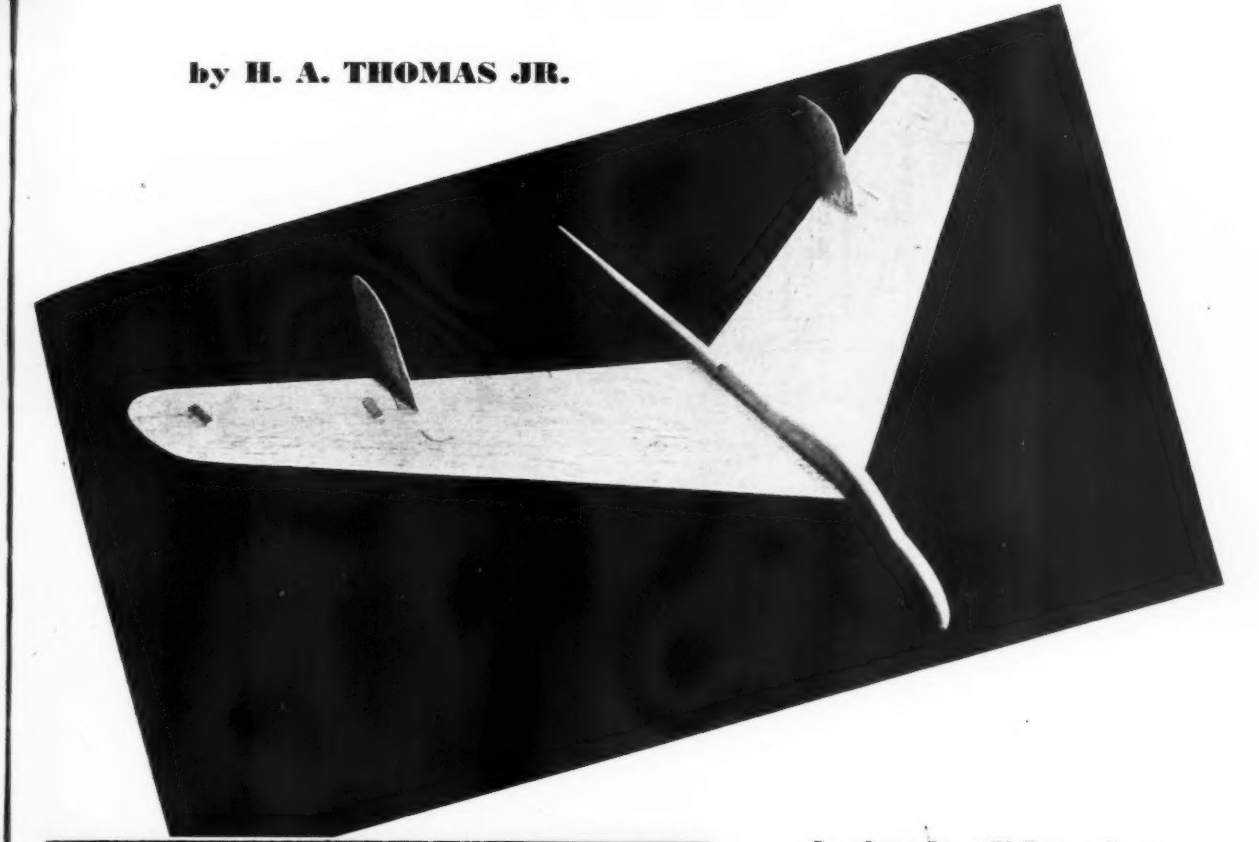
To provide all-weather operation, radar navigation and torpedo aiming equipment was specified. Wartime experience in other types, however, had proved the vital need for extremely close coordination between pilot and radar operator, and Grumman and Navy engineers solved this problem by locating the pilot and radar operator in the same cockpit side by side! In this manner the pilot himself would be able to watch the "scope" as the radar operator manipulated the equipment.

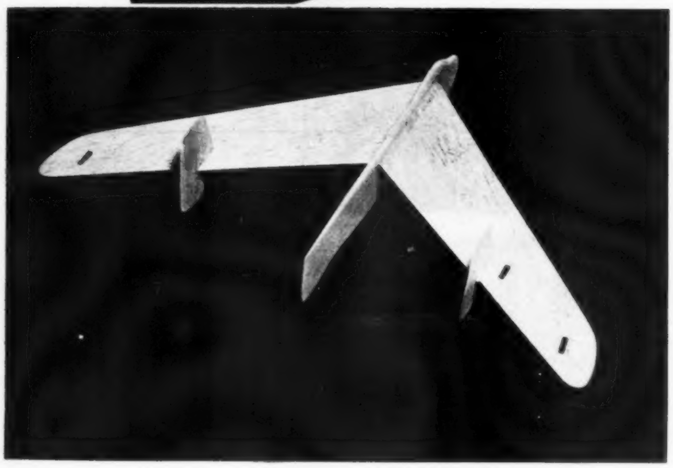
With this basic layout decided, Grumman engineers produced the XTB3F-1 prototype and plans were made for its production when a combination of events caught the new design in mid-passage and initiated a series of de-

(*Turn to page 62*)


EF-128
1/8" SHT. FUSELAGE
PAINTED
NO DIHEDRAL
CLAY
ASSEMBLY
1/16" SHT. FINS
SPLICE
ALUMINUM STRIPS
1/16" SHT. WINGS

by H. A. THOMAS JR.





A simple glider that will teach the principles of tailless design

EF-128 Tailless Glider

WHEN German aircraft plants were captured just before the surrender, numerous aircraft designs were uncovered in various stages of design, construction and test which were most startling. They included huge jet powered flying wings, man-carrying V-1s, multiple jet bombers with sharply raked wings, and many others.

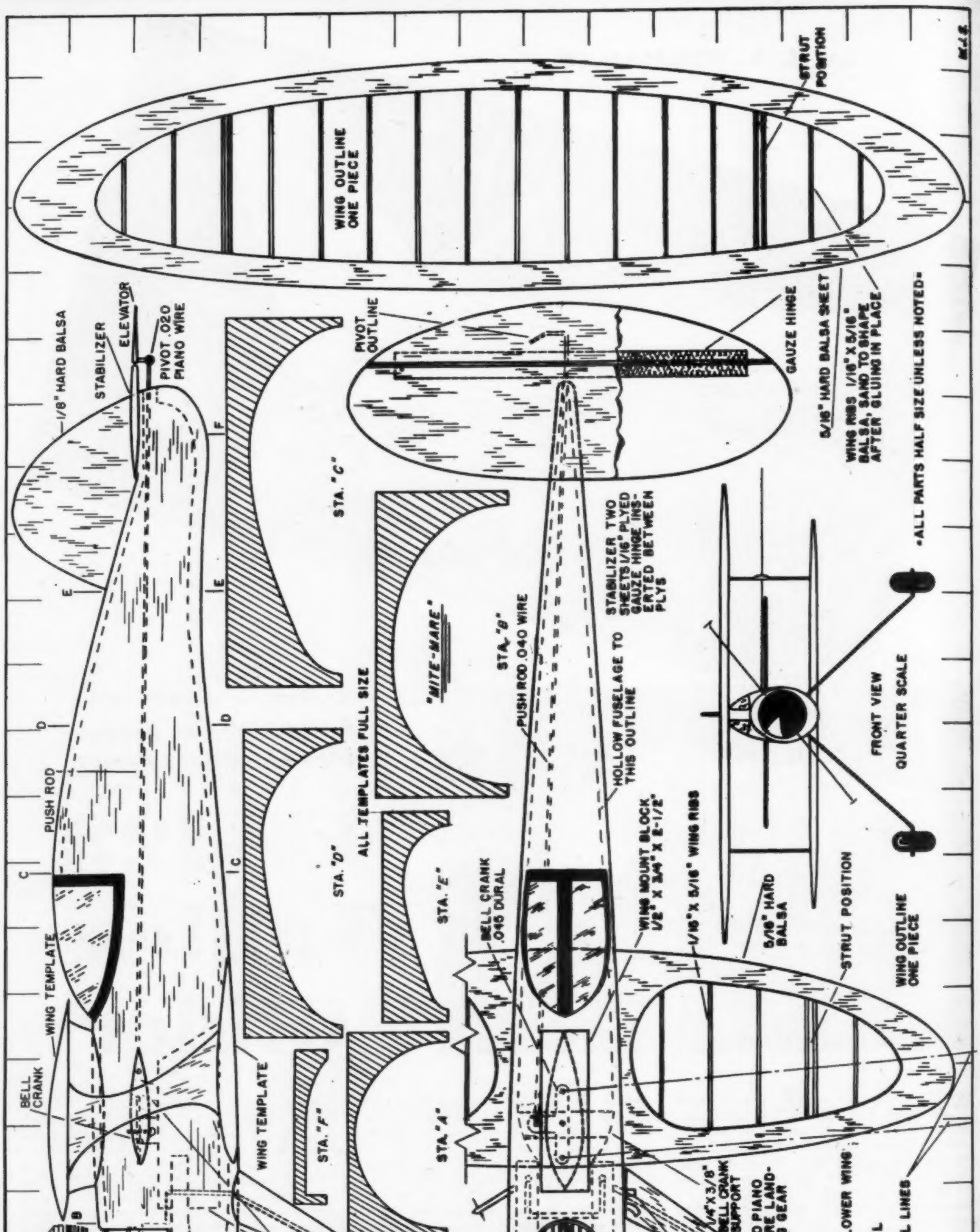
One of the most interesting was a tiny jet fighter, designated EF-128, seating two, having sweptback wings and no empennage. Fins and rudders were located midway of the thin wing panels. Whether the craft reached test-flight stage is not known, but detailed drawings were uncovered indicating equipment for a variety of duties, and assembly drawings show that the project was receiving careful consideration.

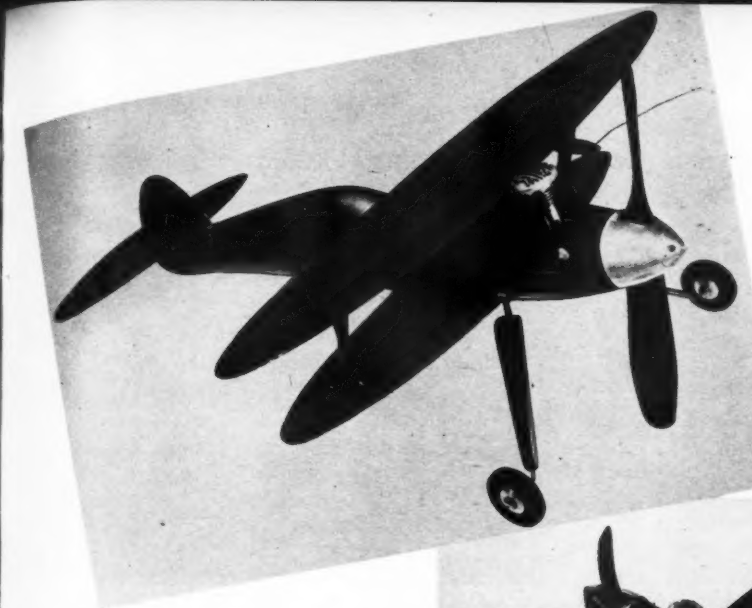
Since the general arrangement is unique, we decided to test it a bit in the form of a profile glider. We were able to refer to a factory three view drawing for scale layout. True scale proportions were used, although the flat profile fuselage results in slightly increased wing area.

The fuselage, of firm 1/8" balsa sheet, is trimmed to outline, rounded at the edges and front and tapered toward the rear. Rear lower fin is an integral part of it. The wing location is accurately marked and a slot is made through the body for the wing panels. The sweptback wings are of medium 1/16" sheet, tapering at the trailing edges and rounded in front. Control surfaces which serve as elevators as well as ailerons are cut apart after the wing is brought to final shape and are fastened by small lapping strips of aluminum for easy adjustment. Fins are also of 1/16" sheet balsa, being carefully streamlined in section and cemented in position. The wing panels are cemented in a butt-joint, without dihedral, within the fuselage slot.

The body may be doped, other parts being smoothed with fine emery paper. If you want a little realism, the model may be painted and crosses and swastikas added, though this reduces flight performance considerably. Balance the model as indicated, check alignment, and make test glides while adjusting tabs and nose weight. Best flights can be made outdoors by handlaunch or catapult launch. It is likely that slight upturning of the wing tabs will be required.

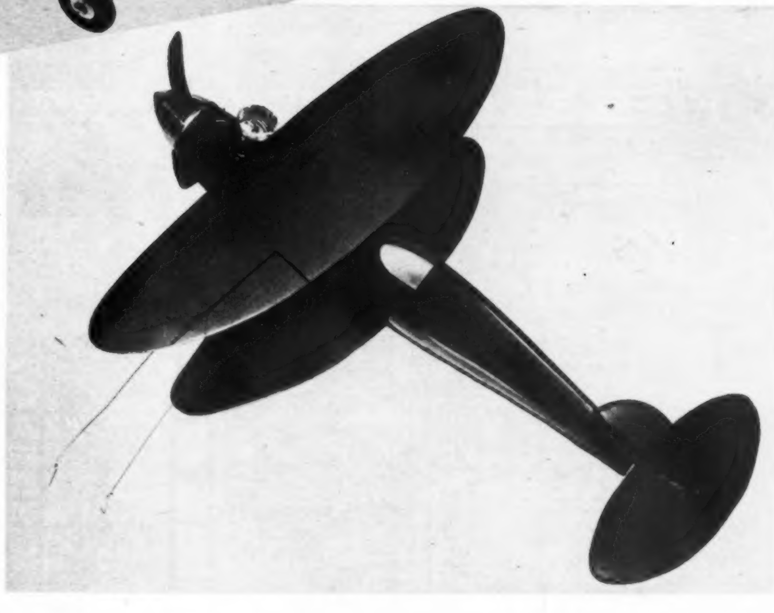
Many people believe that future aircraft will develop along tailless and flying wing designs, and we can get a basic understanding of flight problems of such types by glider experiments.


MITE "099"
GAS TANK POSITION
HARDWOOD LINE GUIDE
BELL CRANK
WING TEMPLATE
WING TEMPLATE
PUSH ROD
1/8" HARD BALSA
STABILIZER
ELEVATOR
PIVOT .020 PIANO WIRE
WING OUTLINE ONE PIECE
STRUT POSITION
STA. "F"
STA. "A"
STA. "D"
STA. "E"
ALL TEMPLATES FULL SIZE
"MITE-MARE"
STA. "B"
STA. "C"
PIVOT OUTLINE
GAUZE HINGE
5/16" HARD BALSA SHEET
WING RIBS 1/16" X 5/16" BALSA, SAND TO SHAPE AFTER GLUING IN PLACE
STABILIZER TWO SHEETS 1/16" PLYED GAUZE HINGE INSERTED BETWEEN PLYS
PUSH ROD .040 WIRE
HOLLOW FUSELAGE TO THIS OUTLINE
WING MOUNT BLOCK 1/8" X 3/4" X 2-1/2"
1/16" X 5/16" WING RIBS
BELL CRANK .045 DURAL
5/16" HARD BALSA
STRUT POSITION
WING OUTLINE ONE PIECE
FRONT VIEW
QUARTER SCALE
•ALL PARTS HALF SIZE UNLESS NOTED•
NEEDLE VALVE
1/16" X 5/16" HARDWOOD MOUNTS
GAS TANK FILLER TUBE & VENT 1/8" COPPER TUBE (SOFT)
1/4" X 3/8" BELL CRANK SUPPORT
.070 PIANO WIRE LANDING GEAR
LOWER WING
CONTROL LINES
1-5/16" RUBBER WHEEL
•1/2" SQUARES



Mite Mare

by BILL SEIDLER



EVERYONE wants to be different, but what's it worth? Nothing as far as I can see; queer lines don't improve performance and definitely add nothing to appearance. So the *Mite Mare* is just an ordinary stunt bipe with nice lines. But brother the performance!

Imagine an .099 job making consecutive loops on 50 ft. lines. Yes, and flying steady as a rock on 80 ft. lines; not just .010" steel lines either, but .015". But that isn't all—the topper is that 62 mph speeds are an every day occurrence. Not ordinary you say? Nope, this little diesel job is pure class all through. Simple to build and sturdiness are other features that make this a must on your stunt parade.

To start construction secure 2 straight grain medium hard balsa blocks 1-1/2" x 2" x 15-3/4". Glue these blocks together, but be sparing with the glue as these pieces will have to be parted later. The 2 inch sections are glued together to make a single piece 3" x 2" x 15-3/4". While the glue is setting cut all the full size fuselage templates from the plan and glue to some fairly stiff cardboard. Now carve the main outline of the fuselage to a rough resemblance of the plan. When the rough outline is completed start using the templates and finish carving. Use #1 sandpaper to bring it to the correct outline. Use 00 sandpaper to finish, then brush on at least 3 coats of clear dope, sanding lightly between each coat. The clear dope prevents soiling the fuselage with finger marks, dirt, etc.

When dry, part the 2 sections of the fuselage and hollow to the outline shown on the plans. Be sure to leave enough stock on the inside where the motor bearers are placed. Note that there is a clearance slot in lower half of the fuselage.

The cabin canopy can be carved out of fuselage or painted in to suit the taste (painting is for me, I'm just plain lazy). Carve the base of the fuselage at the wing root to match the upper camber of the bottom wing. The lower wing is just butt jointed in place; use lots of glue and plastic wood at this point.

Insert the 1/4" x 3/8" bellcrank support in the upper half of the fuselage. Make the bellcrank as shown and fasten in place. I used an extra large stunt fuel tank on my model (you know—for that long flight). Be sure the copper feed line tubing runs to the rear of the tank. Use .008" brass shim stock to make the tank.

Insert the motor mounting bolts into the hardwood motor bearers before gluing them in place. After the gas tank and the push rod have been inserted, paint the inside of the fuselage with clear dope; give it at least 4 coats of dope to protect it from the fuel.

Now glue the 2 halves together; use a mixture of glue and plastic wood to form this joint. The fuselage can be lacquered, color doped or painted to suit your taste. When painted, the upper half of the cowling at the engine can be cut loose to allow for access to the motor bearers; install the engine, then glue the cowling back in place.

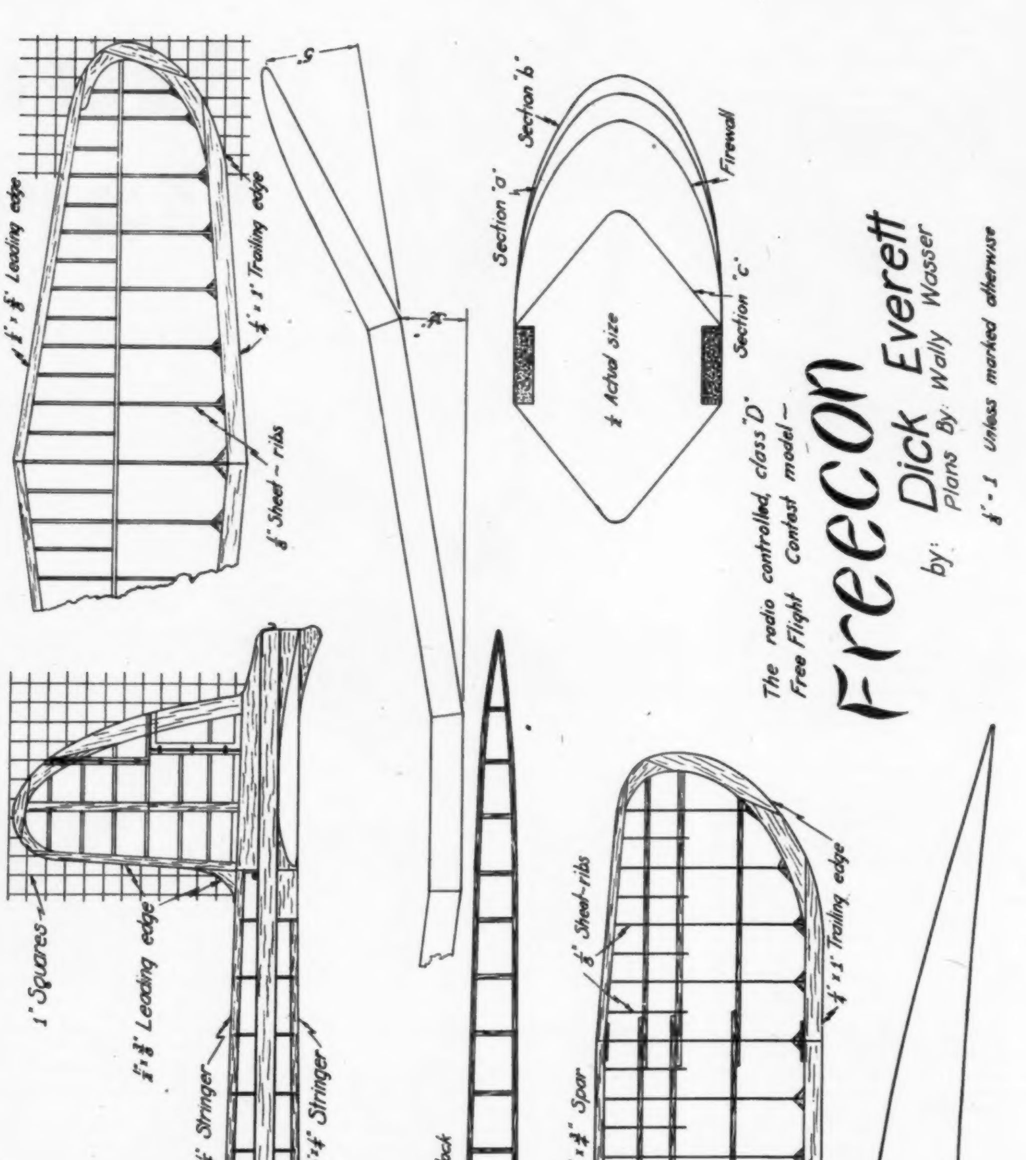
The wings are constructed out of 5/16" hard sheet balsa. First cut out the outline and sand the entire wing to shape. Wing templates are on the fuselage side view. When shaped cut out the inner panel of the wings to the outline shown. Note, both wings are made in one piece. After the outline is finished, cut wing ribs from 1/16" x 5/16" strips. These rectangular ribs are glued in place and then the wing contour is sanded into the wing ribs. Silkspan is used to cover the wings. Be sure not to cover the bottom section of the wing where the wing struts are inserted in place. The wings are glued in place before these struts are inserted. The wing pylon on the upper wing is also glued in place before the wing is covered. This pylon is inserted up into and between the 2 center ribs. Now cover the wings and glue in place as shown.

The stabilizer is made in sandwich-type construction. However, the gauze or cloth hinge is inserted before the sections are glued together. The pivot of .020" wire is just glued to the bottom of the elevator as is shown on the plan. Insert the push rod and glue the stab in place.

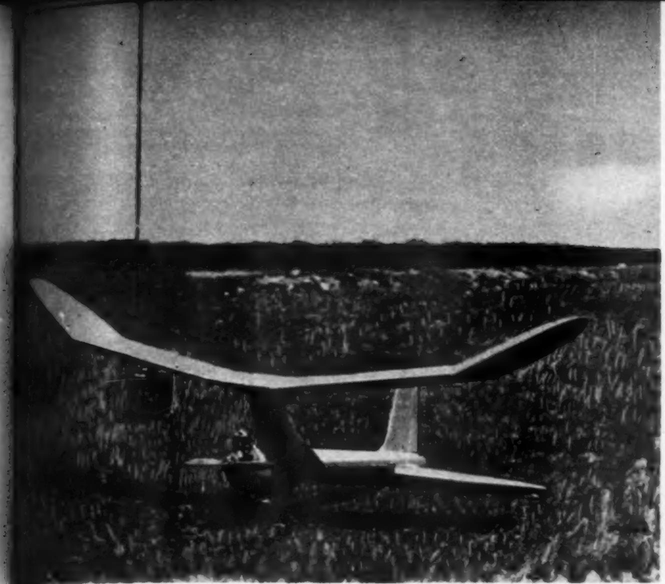
Now form the rudder of 1/8" sheet, sand and glue in place. The wing struts are glued in place to complete the construction of the model. The line guide can be made out of plywood or any hardwood and glued in place.

FLYING—It's a wise man who will follow the control procedure as shown on the plans, and brother if you don't know how, now is the time to learn to fly clockwise. These little *Mite* diesels are very powerful and definitely "torquey." Fly a *Mite* job counter-clockwise and she'll sure as popping, come arolling in on the lines and you'll be wearing her around your neck. I know—I've been chased right out of the circle.

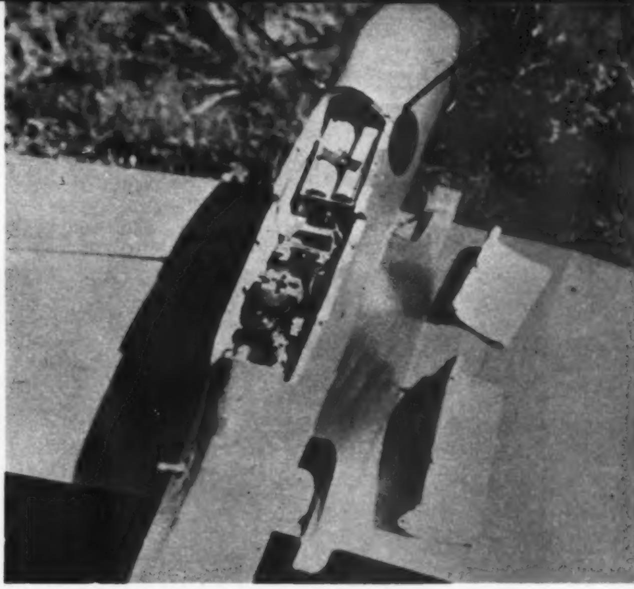
This little job will fly right from the beginning. However, fly it a few times straight and level until you're sure of all its flight characteristics and then you can cut loose and throw the book at it. Lots of flying and keep loopy.



The radio controlled, class 'D' Free Flight Contest model—
Freecon
by: Dick Everett
Plans By: Wally Wasser
Unless marked otherwise
1" Squares
Leading edge
Trailing edge
Stringer
Spar
Sheet-ribs
Pylon top
Lead. edge
Crutch is made from hard stock
Typical airfoil
Actual size
Section 'a'
Section 'b'
Section 'c'
Firewall



Freecon ready for a record breaking flight; transmitter is in background



Hatch covers removed from receiver and battery compartments

Freecon

by DICK EVERETT

A new concept of radio control—use it for F. F. contest work

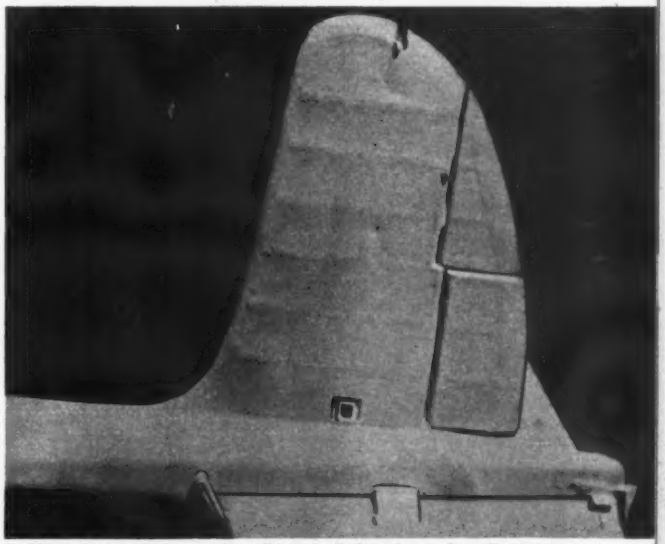
WE HAVE had radio controlled models for about 10 years—big bulky, heavily loaded models with a slow rate of climb, lumbering along like a transport; models that the builders have been able to fly any place they please and control through any kind of maneuver. The receivers used in these models were for a large part complex pieces of equipment which were heavy and needed a lot of model space, both for mounting the receiver and for the power supply needed for operation. The equipment was so intricate that it was continually getting out of tune and consequently out of control. With all this the modeler really had to know radio inside and out in order to install a set.

There have been instances when model builders in different sections of the country have collaborated with radio amateurs, or "hams," and by working together each on his speciality, have constructed and installed a set in a model. A few actually flew them; but for some reason most of these projects were dropped and in consequence radio controlled models were a novelty; their scarcity was alarming.

Then came the revolution—a commercial, single channel, *lightweight*, outfit was put on the market; this first one was soon followed by a second. Although the prices of these two units will undoubtedly drop once the initial cost is met, the upkeep is very low and the satisfaction unlimited. These units come from the factory completely finished, ready to install in your model. The instructions included are very complete and any builder who can follow the plans to build a model will find himself quite capable of installing one in his ship. One fact must be taken into consideration before any flying can be done: your transmitter must be operated by a ham, or a licensed radio operator. A lot of false hopes were built up during the past year about the so-called "Citizen's band" for our models. Practically every radio man with whom I talked about this higher frequency of operation has told me that for the present this channel should be forgotten, since a lot of research will have to be done before this band will be practical. Estimates in time ranged from 1½ to 5 years. (See page 36, April 1948 M.A.N.)

The *Freecon* was only an idea for quite a few years; controlling the glide by radio so the time could be built-up by keeping the model overhead in the timer's sight seemed like a practical scheme. With the advent of the new rules the idea is still good, for you are able to keep the model in sight for the full ten minutes and land near the launching site. The model isn't very big when compared to the models being flown under the present rules. The weight is not high; in fact several coats of dope were added to bring it up to weight (the original model weighed only 58 oz. complete). The model was built exception-

(*Turn to page* 46)

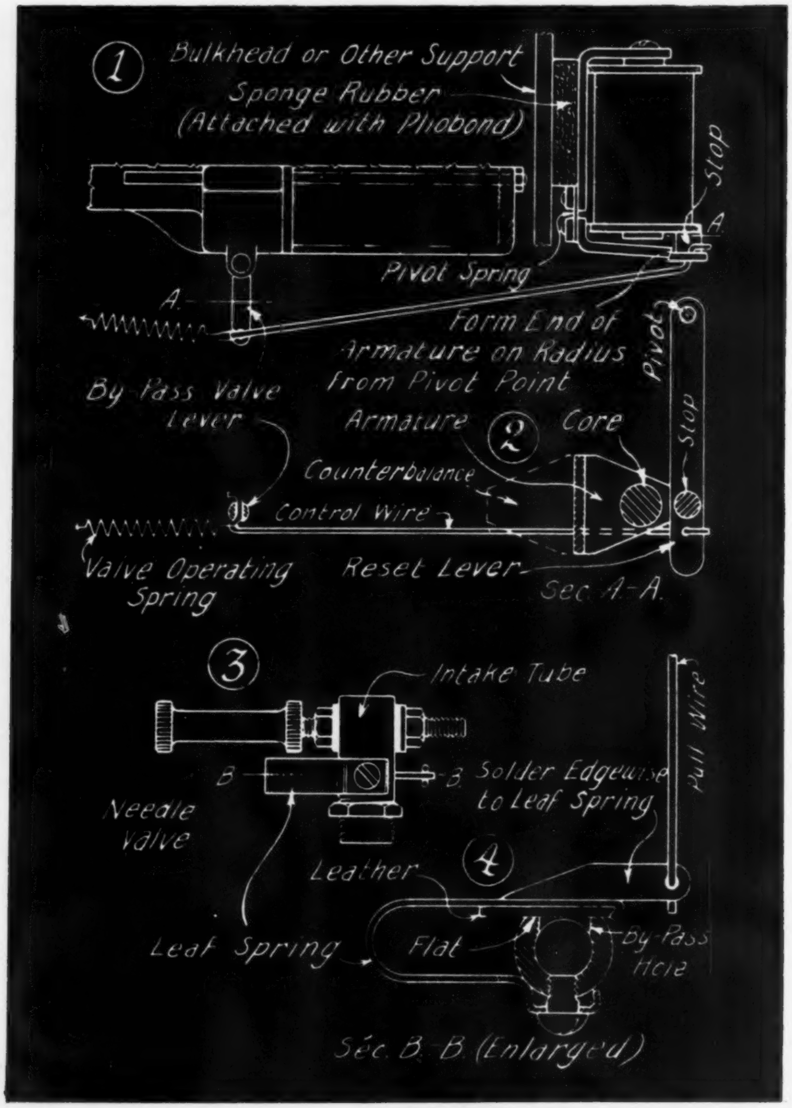


Rudder is in two parts; one is radio controlled—other is for adjustment

Extension switch allows the operator to fly ship in any direction with ease

C.I.E. Cutout

by RAY RUSHER



Cut out mounted on *Drone* diesel

Closeup of special parts that must be made

JIM WALKER'S *Remoto U-Reely* control is ideal for controlling engines having electrical ignition systems and equipped with two-speed timers. It can also be used for stopping C.I. or glow plug engines by using the relay in the plane to close a fuel valve or open an air by-pass leading to the intake tube or crankcase.

The *Mite* engine for instance has a by-pass valve that admits air to the crankcase. While a relay doesn't have sufficient power to open this valve, a spring can be arranged to do so and the valve can then be manually closed and latched in the closed position by the relay armature before starting the engine. Subsequently when the relay is energized its power is used for unlatching.

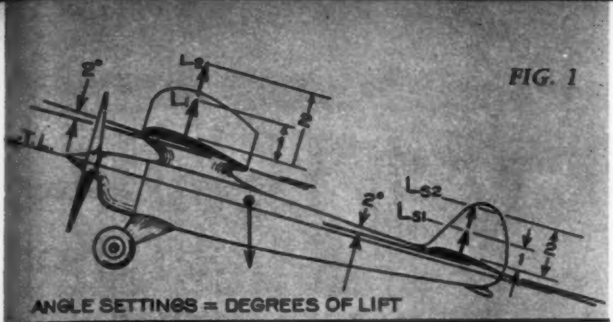
For the *Drone* engine, a simple air by-pass valve as shown in the photograph can readily be made by the average modeler. Remove the needle valve body from the intake tube and then remove the tube from the boss on the crankshaft bearing into which it is screwed. Drill a 11/64" hole in the back of the tube about midway between the locknut that fits against the boss and the needle valve body hole. File it out square, as a round hole 5/32" in diameter will only slow the engine down but will not stop it.

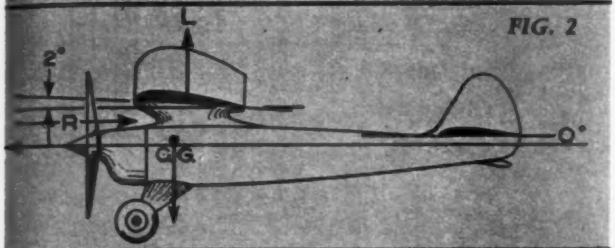
Bend and drill a leaf spring of bronze or spring brass about .010" thick and 1/4" wide and attach it to the front of the intake tube with a 3-48 x 3/32" screw, the tube being drilled and tapped to receive the screw. A sealing element (1/4" x 7/16" thin leather) is cemented to the leaf spring. It is best to file off a flat spot around the square by-pass hole for the leather to seat against. The leaf spring should be so bent that the pressure of the leather against the flat spot is light but firm with the leather seated squarely against the flat spot.

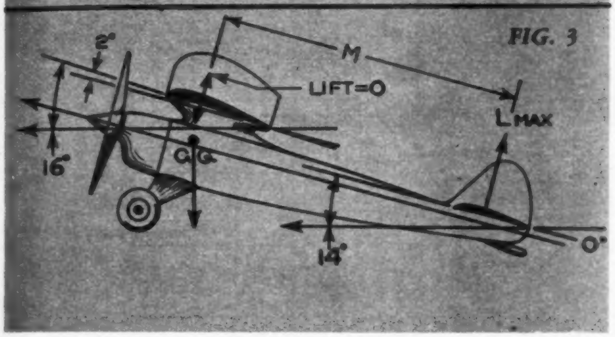
It is now obvious that the leaf spring can be sprung away from the intake tube by working a pull wire so that the leather valve opens the by-pass hole. This lets air into the crankcase at a point below the needle valve which causes less suction in the intake tube around the needle valve body. Consequently less fuel is atomized from the needle valve opening, the fuel mixture is leaner, and the engine is stopped when the leather is spaced about 3/32" or so from the intake tube. The engine smokes and sputters a few revolutions and then stops, but not too suddenly (which is an advantage).

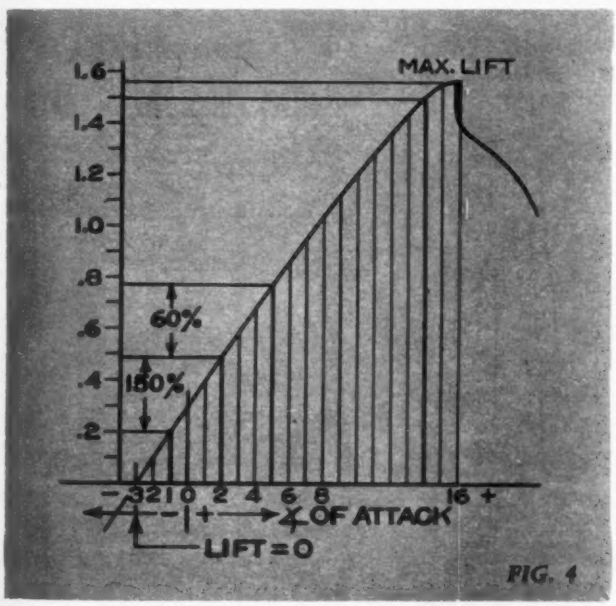
Connect a spring-loaded reset lever to the leaf spring by means of the pull wire and arrange the relay armature to act as a latch for the reset lever as in 1 and 2, and your job is finished. Now, when the B-battery is connected to the relay, the armature is attracted by the relay coil when current flows through it, thus unlatching the reset lever so that the spring loaded reset lever is free to open the by-pass valve.

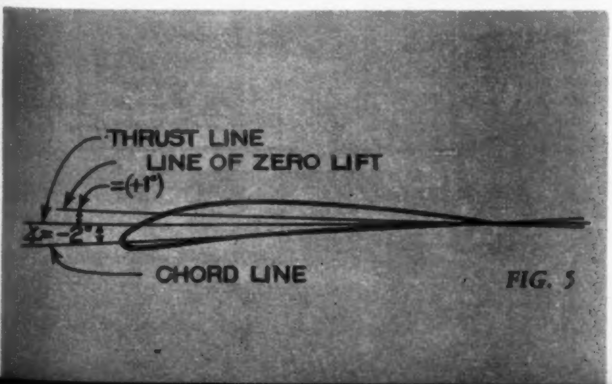
To minimize the effect of vibration on the latch and the latch release mechanism, mount the entire relay assembly on sponge rubber as illustrated in 1. The relay armature should be of the balanced type to prevent its being affected by vibration of the engine and bumping along the ground when taking off or landing. If it has unequal mass on opposite sides of the pivot point, remove it and build up the lighter end with a counterbalance soldered or riveted to it as suggested by dotted lines in 2. Another way of minimizing undesirable armature movement is to mount the relay on the plane so that the armature swings in a fore-and-aft direction. This, combined with a balanced armature, is ideal.











A low winger by structural design, this is aerodynamically a high winger

design forum

by CHARLES H. GRANT

THE most interesting thing about aviation in general and aerodynamics in particular is that there is always something new to learn, regardless of how much experience you have had. Struggling with aviation problems is like a voyage of discovery in which the unexpected and novel is sure to turn up at one time or another to challenge your knowledge and versatility.

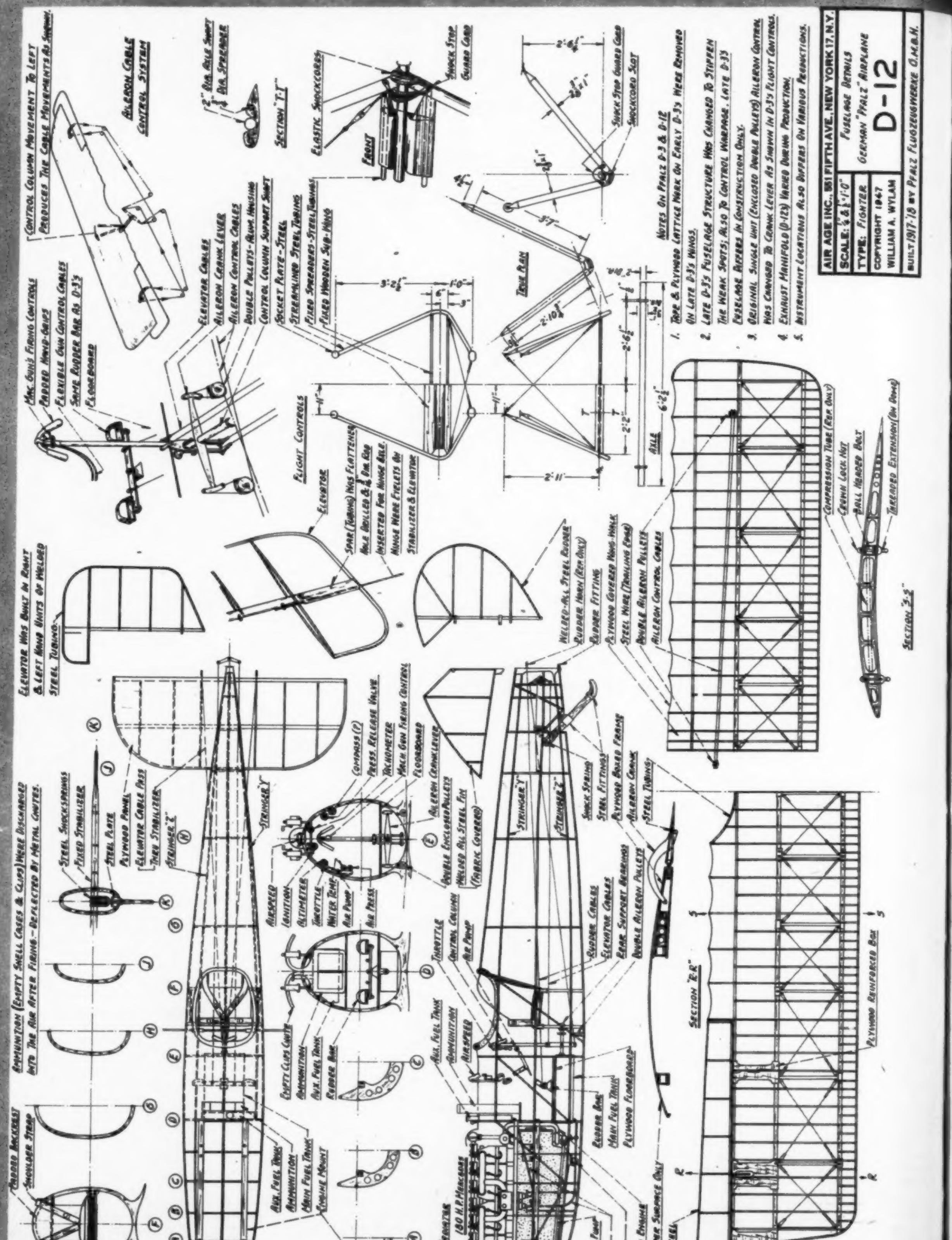
Design Forum exists because of this fact, and its purpose is to serve as a guide through the morass of design problems that beset the young aviation scientist. Oldtimers in the game often feel that through long experience they have all of the facts "fenced in" and under control, when suddenly their whole timetable of thought is knocked into a cocked hat by some new problem or theory which appears to contradict the results of their previous experience. Sometimes these new ideas come from young men with little experience but great mental agility, students who have not found out what they cannot do. Most often, though, what appears to be a new idea or a refutation of an old theory springs from misapplication to actual practice of a true and basic theory. Students without experience to check their theories often make this mistake. Consequently, it is always wise for both oldtimers and young theorists to approach aerodynamic problems with care and respect and without assuming that their conclusions are final.

W. F. McCombs of St. Charles, Mo., is one of the sincere students of aeronautics who challenges practice with theory. He writes: "For some time or rather in some instances you have stated in your column that in some mysterious manner the elevator setting affects stability. That absolutely cannot be the case, for the elevator setting is a constant factor and when its derivative is taken with respect to anything the rate of change is zero. The tail setting affects only the angle of trim of the model and in no way affects the static stability." This is a very positive statement that challenges at least 35 years of experience of thousands of model builders, provided the terms that Mr. McCombs used mean the same to him as to other model builders.

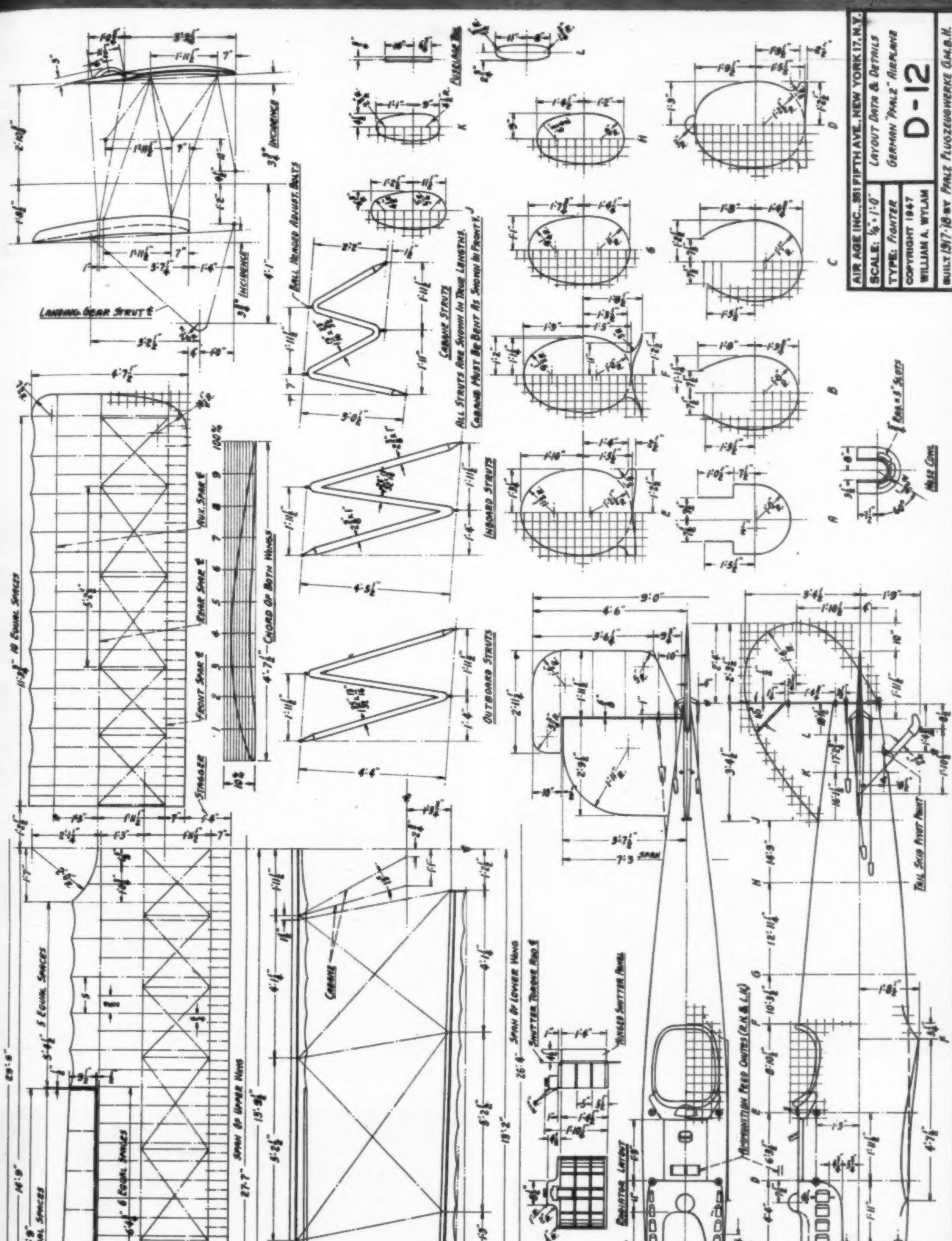
Let us consider this matter carefully. First, we must define stability. The following definition has been accepted as accurate over a long period of years: Stability is that characteristic of an airplane which causes it to resist displacement from its normal flight path, or which tends to bring back the plane to its normal flight position when displacement occurs. On this basis Mr. McCombs

(Turn to page 67)

These pages complete the Pfalz Masterplans. Next i



...ntain plans for the Mercedes engine used in this ship.



WYLAM MASTERPLAN

AIR WAYS

News of Model Airplane Experimenters All Over the World

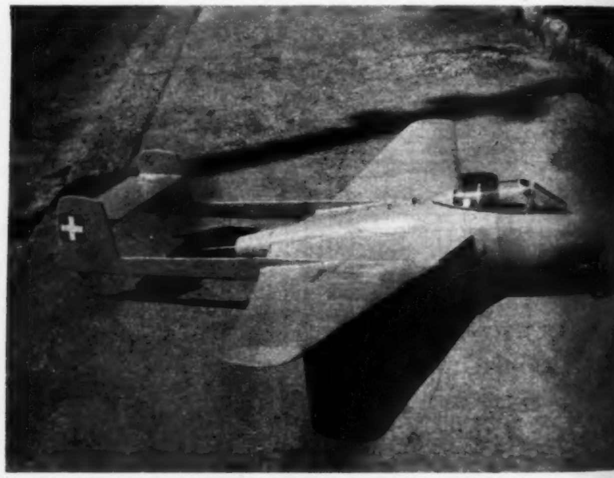
No. 1 J. Fox and Peter Sandford display their flyingboats and boast of stable flights

No. 2 Robert Cowherd's scale *Fokker D-VIII*

No. 3 Jet plane held by Russell Dunham

No. 4 R. E. Schumacher's wife holds his radio control

No. 5 Ensign Henry T. Stanley's unusual type of flyingboat



No. 6 *De Haviland Vampire* which contains a jet engine, by O. Max Dreher

No. 7 Philip Hmiel's *Yogi* powered by an *Ohlsson 23*

No. 8 Channel wing control liner by Lynn Christensen

HELPING OUR FELLOW MODELERS. We recently received a letter from Delbert A. Baston of Muncie, Ind. who we feel has come up with a really good idea. Seems he started correspondence with an English model enthusiast after the latter had appealed through the columns of M.A.N. for a pen friend. After several letters had been exchanged, Mr. Baston offered to send across an old but entirely serviceable engine. The response was certainly gratifying—the English modeler wrote in part: ". . . Now your bit about sending an engine over. I really don't know what to say about that. I was absolutely flabbergasted when I read your offer. I really do appreciate this—I can't find suitable words to express my thanks."

Upon noting this reaction, Mr. Baston decided it might be a good idea if other American modelers dug around their shelves and pulled out their idle engines, of which there are undoubtedly many thousands in this country. As he points out, "junk" motors would be of little use to foreign modelers since repair parts would be unobtainable. But think of all the good serviceable engines that are now collecting dust, just because they are not the latest type, or something "hotter" has superseded them.

Members of Mr. Baston's model club are readying a shipment of motors to the members of his English friend's club. As Mr. Baston puts it: "I think it would do us good to 'clean house' of our outclassed engines."

If there is sufficient interest, we believe it would be fine to offer these old but useful engines to modelers anywhere overseas. Should any reader or club care to get in touch with us we will be glad to send them names of foreign modelers. Many names can also be obtained from our *News of Modelers* columns each month. What say fellows? Let's send some of those "surplus" motors where they will do the most good.

NOW IT'S MUFFLERS. Many flyers active in control line work have had the experience of being tossed out of their favorite flying spot with the now well known complaint, "Sorry, fellows, but you make too much noise. The people living around here . . . etc., etc." No need to elaborate, you know the story. All is not lost, however. Rumors have been floating out of the West that something *can* be done about it. Seems that very simple mufflers will cut the noise down enough so that even the crabbiest citizen won't complain. We are gathering data on the construction and operation of several types of mufflers for presentation in an early issue. Meanwhile try your own mufflers. Don't wait 'till you are forbidden to fly in your community—beat them to the punch!

• •

Picture No. 1 submitted by J. Fox (140 Awaba St., Mosman, Sydney N.S.W., Australia) shows Peter Sandford and Mr. Fox with their flyingboats. Both planes have 53" wingspan and each airscrew is powered with 12 strands of 1/4" pretensioned rubber. Their flights are very stable and successful.

Robert Cowherd (Box 1153, Colgate Univ., Hamilton, N.Y.) sent in No. 2, a *Fokker D-VIII* control line ship powered by a *Bantam* engine turning an 8" diam. 10" pitch prop. It features 27" wingspan, removable cockpit and cowling, and it sports a flashy fire-engine red paint job with the iron cross insignia on a white background. It handles easily while hitting a top speed of about 55 mph.

No. 3 was contributed by Russell H. Dunham III (Bott-Kenyon College, Gambier, Ohio). This jet model averages 105 mph. The terrific roar added to the high velocity of this flying ball of fire is an impressive sight. The motor is a standard type *Dyna-jet* and is highly sensitive to control which requires very slight movements of the control handle. A long run is necessary for the takeoff, probably due to the excess weight of fuel; the ship carries 5-1/2 oz. of gas. High speed type foil is used and the builder uses the fuel feed system which is recommended by the *Dyna-jet* manufacturers.

Richard E. Schumacher (275 W. Santa Anita, Burbank, Calif.) built the radio control ship, No. 4, which his wife is displaying. The model is his original design; span 57", chord 8", length 38", weight complete 37 oz., airfoil R A F 32, powered by a *K & B Torpedo 29*. The radio unit is an Aerotrol receiver with the rudder control unit constructed by Herb Owbridge. It utilizes the Rhoades spoon which allows rudder, elevator, two speeds of motor and motor cutoff for a 1.1 oz. unit.

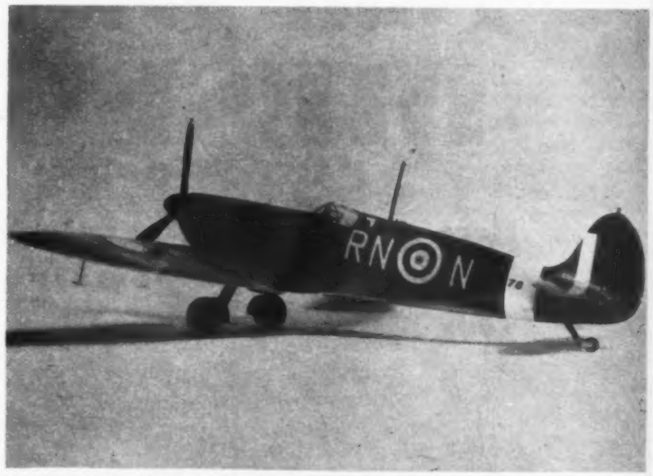
Ensign Henry T. Stanley Jr. (VP [ML]-4 NAAS, Miramar, San Diego 45, Calif.) sent in No. 5, an unusual type of flyingboat which he calls the *Pelican*. It is powered by an old *Dennymite* and has a span of 5'. Stability under power is fair and stability in glide excellent. From a dead stand-still on the water (salt) in 4 times out of 5 it was in the air in less than a 20 ft. run. All the *Pelican's* takeoffs were unassisted.

No. 6, submitted by O. Amrein (Wattstrasse 8, Basel,

(*Turn to page* 52)

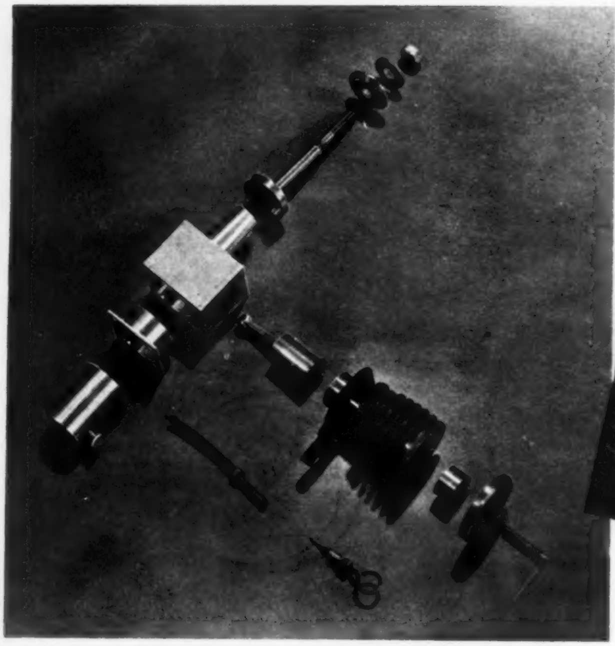
No. 9 Original CO2 powered pusher by Leonard A. Savastio

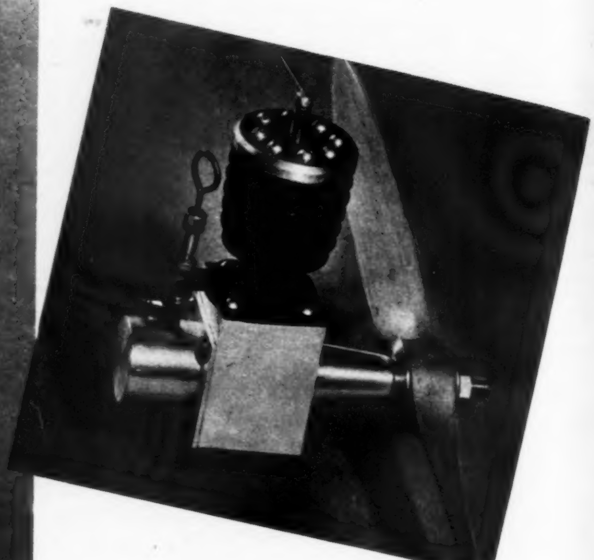
No. 10 Oral G. Sizemore's *Miles Magister* built from M.A.N. plans



No. 11 Accurate *Spitfire* constructed by Walter Fitch

No. 12 Class C cabin job by Chet Smith is as yet untried

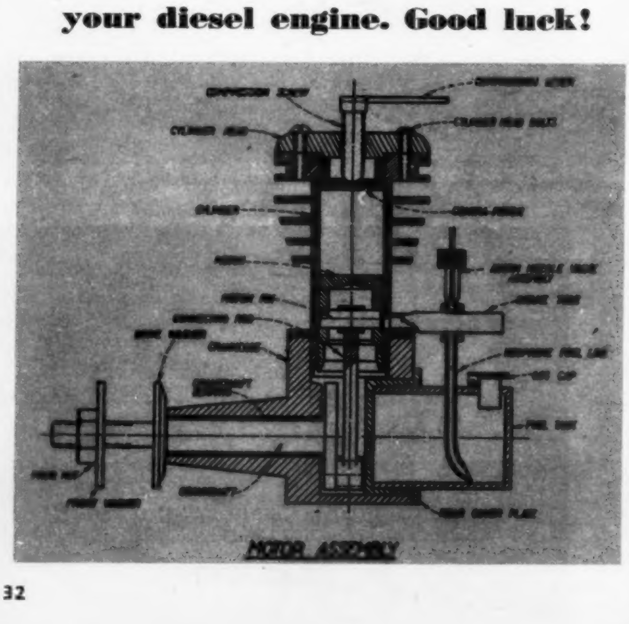




Build Your Own DIESEL

PART TWO

Here are the plans and instructions needed to complete your diesel engine. Good luck!



by JAMES NOONAN

BE PREPARED to spend some time when making the remaining parts of your diesel, giving considerable thought to each step before beginning work. Thus you will be assured of little or no spoilage.

CRANKSHAFT—Face a piece of 1-1/4" dia. cold rolled steel rod, 3-1/16" long, on both ends. Locate and punch centers, then center drill both ends. With work held on lathe centers but with spindle not turning, run a pointed tool along the length of the rod to scribe a mark exactly parallel to centers. Remove work from lathe and scribe lines from centers to the line on outside of the work. Use dividers to locate crankpin turning centers and center drill on both ends. Extreme care must be exercised in this layout.

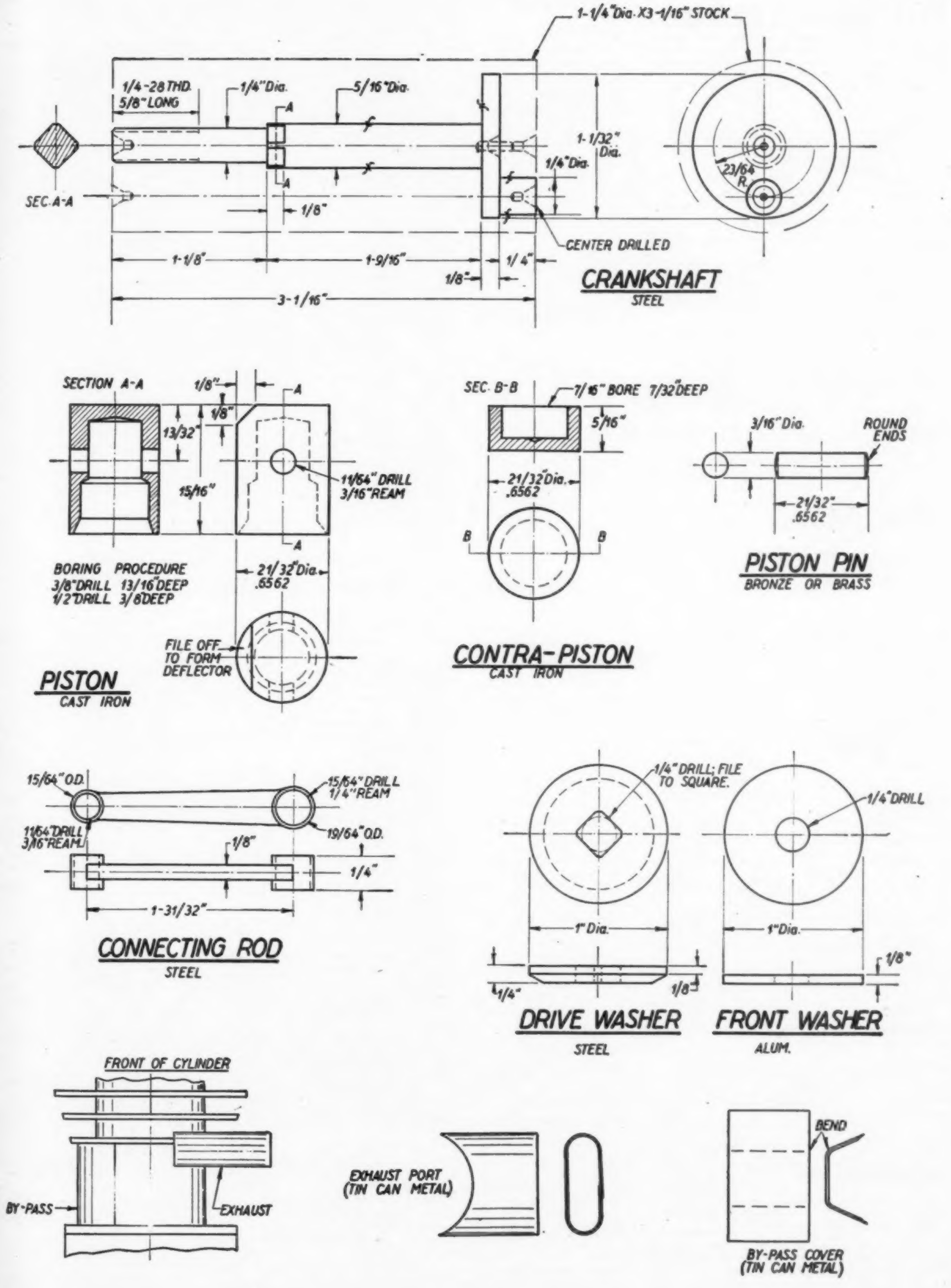
Mount the work on crankpin centers and turn down the stock slowly using back gears. Turn crankpin to exact size and take a fine finish cut at high speed. Crankpin may be ground if you have a toolpost grinder.

Remove work from the lathe and remount on the true centers; turn the shaft to about 21/64" dia. Turn the crank wheel to exact thickness and diameter. Take a finish cut at high speed on bearing surface, cutting to exactly 5/16" dia. (or grind to exact dia.). Turn front end of shaft to 1/4" dia. Cut threads partially on lathe to make certain they are started straight and finish with a die by hand to hasten the job. Remove from lathe and file a square section for the drive washer as shown on drawing. Slip the crankshaft into the crankcase to check for fit. The rear edges of the squared section should extend about 1/64" past the forward edge of the bearing to allow sufficient end play for free running when the drive washer is in place.

PISTON AND CONTRA-PISTON—Select a piece of Meehanite or other close grained cast iron and rough this turn down to about 3/4" dia. and 2-1/4" long. Slowly work the O.D. down to about 11/16" dia. Now you have 2 choices: either (a) grind with a tool post grinder, or (b) take very fine cuts at high speed with a rounded tool (which drags and gives a smooth finish) until the piece is 3 or 4 thousandths over the specified dia., *always testing the fit in the cylinder*. Work the outer 1/2" down farther until it is just possible to get the stock in the cylinder; this section will be the contra-piston. (It must be a tight push fit.) Bore as shown on drawing and cut off.

Reface the end of the stock and bore the piston as shown. Its O.D. may be lapped or ground to size. Either grind until a tight sliding fit is obtained or make a lap of soft metal and, using the procedure outlined under

(*Turn to page 60*)

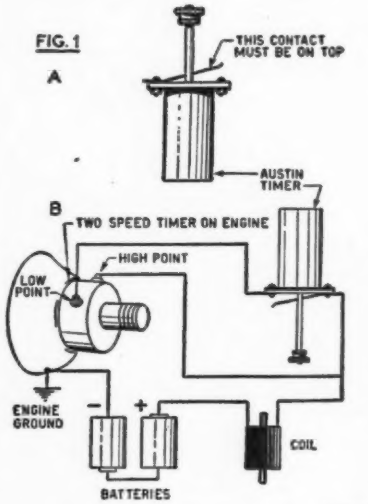


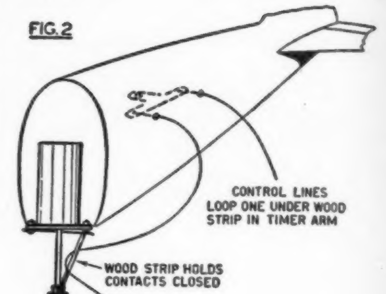
Complete Your Diesel from These Plans

Simplified 2-Speed Engine Control

by Walter Herr

HERE is a kink I've been using and having a lot of fun with. If any of you fellows have a motor with 2-speed timer points, you don't need a lot of batteries, relays and insulated control wire to go with it. Just grab yourself an Austin-





timer and reset contacts as shown in Fig. 1. Then, with this wired to the ignition points as shown in Fig. 1a and a small piece of wood inserted between the adjusting nut and the movable contact of the Austin timer (Fig. 2), you can start your engine. Allow it to run at low speed while you walk to the center of the circle; pick up the lines, and with a slight tug on one line the engine will roar into high speed and you're off.

After a predetermined time, your timer again closes contact (low speed) and you can bring your ship in for a perfect landing and taxi to an easy stop with the engine still running.

Rudder Operating Device For Radio Control

by W. H. Butler

THIS device employs the principle that: a cord or cords shortens its overall length as it is twisted, and conversely lengthens as it is untwisted.

It is also evident that two strands of cord twisted parallel-wise gives a gear-reduction effect in the proper range of proportion to use directly in this application.

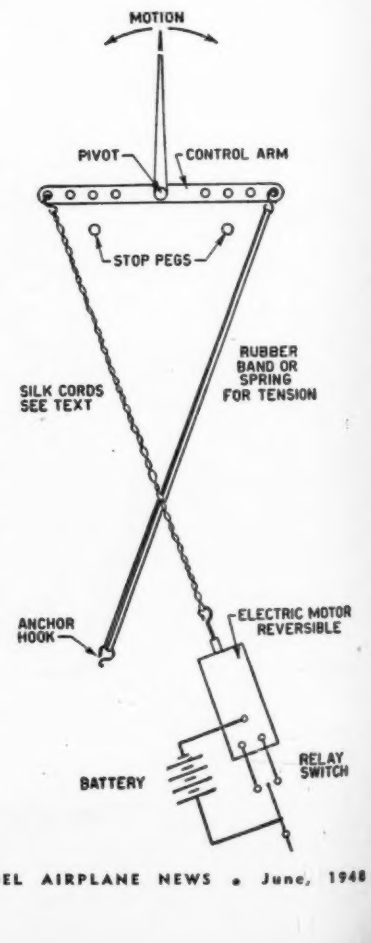
Referring to the sketch, the motor turning in one direction shortens the cord length and thus pulls the control arm toward the motor. In this action, the rubberband (or coiled spring) on the opposite arm stretches. If you reverse the motor, the cord unwinds and thus lengthens itself, and the rubberband pulls in the opposite control arm, thus keeping the cord taut.

The holes drilled in the control arms provide a handy method of changing the pressure-to-motion ratio to match the need of the particular application. Likewise, the size and length of the cords, and the length and number of the rubber strands will change this ratio.

The device will work even if the tension element and the twisted cords run directly to the control arm without being crossed as the sketch shows. It is better, however, to cross these lines of pull because this method gives more uniform action throughout the arc of arm travel.

Those of you who are building radio controlled models have probably studied practically all the literature on the subject, and this article does not attempt to add anything to the radio lore already published. Just to freshen your memory, however, I shall describe the action of the relay switch I am using. When the transmitter is "on" the motor will turn in one direction; when "off" the motor will turn in the *opposite* direction. The transmitter is provided with a slow-motion keying vibrator, throwing the transmitter on and off in a uniform time mode. Thus the transmitter has three positions: (1) on; (2) intermittent; (3) off.

When the control is applied to the airplane rudder, these three transmitter positions are translated into the following motions of the rudder: (1) right; (2) rudder motion stop; (3) left. The action in position 2 (or lack of action) is accomplished by reversing direction of the motor so rapidly there is no perceptible motion in the control arm.



West Coast Tips

(Continued from page 8)

meet is attached to the record trials and is sponsored by the *Fresno Control Fliers Club* and the Fresno Junior Chamber of Commerce.

"Trophies are awarded for 1st place in all events, monthly. Entry fee is one dollar per ship. California Association of Model Clubs Precision rules prevail to the letter."

Roy says his club's annual meet is June 13. This is a big meet, with Record trials again. Hey, Southerners, here's a good place to hold the North-South meet this year, what say!

* *

We ran into Mel Farrell the other day when California's famous liquid sunshine was (if you will pardon the expression) precipitating. Mel is a real honest-to-goodness oldtimer. He was building models when most of us were just a thought. And when he builds them, they are right. He has the most complete, the most intricate miniature (exact scale is a masterpiece of understatement), *Bellanca* cabin plane we have ever seen. His free flight jobs are also right on the money.

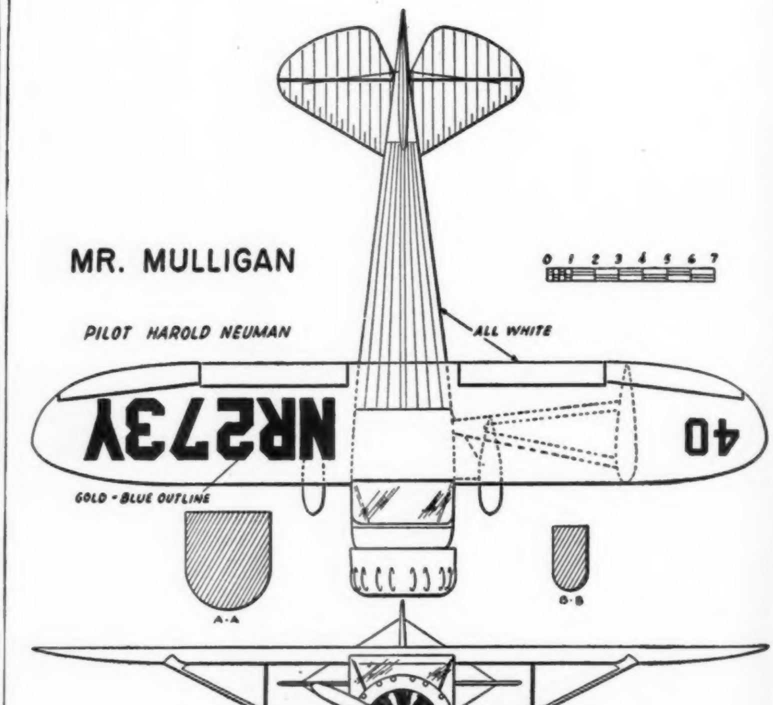
Mel is a hobby jobber when he isn't busy building some ship and makes a right smart living at it, too. But the cream of his milk is the club which he helped to start, called the *San Valeers*. Composed of boys from the San Fernando Valley—which includes Burbank, Glendale, North Hollywood, Van Nuys and neighboring towns—the *San Valeers* have quickly earned a respectable reputation for their ability to collect thermals.

In fact, not so long ago they *really* collected *Thermals* (*Thermal Thumbers*, that is) when they took the National Club team champions out to their field in Van Nuys and really pounced on them. We weren't there, but it is said that the "TT" stood around quite a while to see how many places down from first the prize announcers would call out before he mentioned a *Thermal Thumber*.

Since that time we imagine that the "TT" have come back since they have some pretty sharp boys themselves, but anyway, the *San Valeers* showed everybody how to do it first.

Mel promised us that his club's secretary would get us some dope if we missed any big meets or big doings, so we just gave them a "blurb" to get it started.

Okay, Mel, let'er pop!



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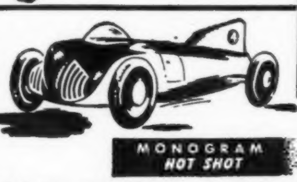
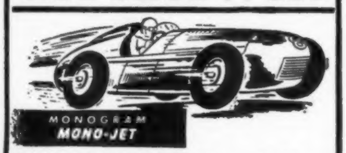


HOT SHOT . . 60c



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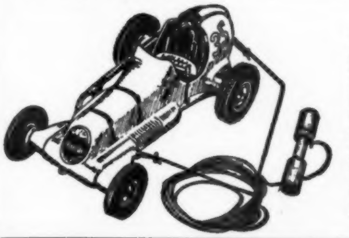

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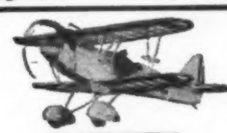

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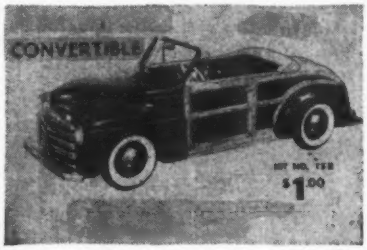

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Expansion Engines

(*Continued from page* 14)

weighting is used and a splash oiler with breather vent provides lubrication.

At bottom of the stroke, air is exhausted not only through the very large port but also through a pressure release slot in the rotary valve. This motor turns up 10,000 rpm with a 2 oz. flywheel at 90 lbs. pressure, but consumption of air is terrific. We loaned it to a friend who tried it at 200 lbs. pressure on a factory air line, and he gave a speed estimate of 20,000 rpm, which seems a bit overenthusiastic.

After about 2 hours running time (much of it spent in getting it synchronized with an electric motor—so we could put a revolution counter on the motor and see what speed we were getting), the motor shows considerable wear of piston and cylinder and the rotary valve no longer fits as snugly as it should. However, at lower speeds and particularly with steam we have found brass to be quite a satisfactory material.

All expansion engines have 2 main requirements: a good smooth valve action, and a source of pressure. There are many types of valve gear which give good results and a few, with appropriate comments included here, are shown in Fig. 5.

(A) The first is the oscillating cylinder valve which is adaptable to steam, compressed air or other pressure. This is about the simplest and most positive valve gear since it requires no cams, cranks or levers and wear tends to improve the seal. Since much of the operating stress of the engine comes upon the cylinder stud it is essential that this part be well anchored. This engine may be reversed by simply switching the intake line from one tube to the other.

(B) is the rotary valve. This, too, is a very simple form of valve and operates with minimum drag. However, a rotary valve is subject to leakage with wear, is limited to relatively low pressures and is not particularly suited to steam. If carefully made it is a fair compressed air valve, but its efficiency is not as high as the more positively sealing types.

(C) the piston valve is very positive in action but has the disadvantage of requiring a separate linkage to operate, and it does put some extra load on the engine since the valve closes against line pressure. It is however practically leakproof if well made, and this feature alone makes it worthwhile.

(D) the slide valve is perhaps the most widely employed expansion engine gear. It wears well, seats without leakage and offers a comparatively minor drag on the engine. It is equally good for steam, air, or CO2, but should have some provision for lubrication if the latter 2 "dry" gases are used. Leakage is apt to occur around the gland where the activating rod enters the pressure chest.

(E) poppet valves offer fast action with minimum leakage and good wearing characteristics. Excellent for steam or compressed air, they may tend to stick if high-pressure CO2 is used, due to the great refrigerating quality of this gas.

(F) the ball valve requires no external drive, seats well and gives little trouble. However, this type of admission works well at high speeds and pressures only. Because of the great amount of "lead" (gas enters the cylinder before the piston reaches top dead-center) a considerable amount of flywheel effect is necessary. If this is not supplied the engine may refuse to start, or may oscillate

back and forth without turning a full revolution. This is probably the best type for high pressure CO2 work and both present day CO2 engines use this principle, but we do not recommend it for low pressure or steam engines.

Efficient exhaust porting of expansion engines offers a special problem. Usually it is not enough merely to cut a hole in the cylinder as is done in 2 cycle engines where the piston itself acts as an exhaust valve.* This is because the cylinder will exhaust only down to atmospheric pressure, the portion of gases remaining offering considerable resistance to the piston on the way up again. Drag of this sort can absorb a high proportion of the potential power of a low pressure engine.

To obtain optimum efficiency the exhaust valve should operate from the head of the cylinder and remain open until the piston is nearly at top of the stroke, closing before or if possible at the same instant the inlet valve is opened.

Thus far we have not mentioned double acting engines; a word about them is in order. A double acting engine is one in which the operating gases push the piston *both* ways by means of a duplication of valves at lower end of the cylinder. This necessitates some sort of packing gland around the connecting rod, a heavier structure and complication of the valve gear. It is, in effect, a 2 cylinder engine in 1 cylinder. On the basis of our experiments we do not recommend this type for aircraft use, although it may be advantageous for model automotive and marine installations. Instead we suggest the use of multiple cylinders, 3 being ideal, since there is no "dead center." In radial expension engines, any number of cylinders may be employed, odd or even, with the power output becoming smoother as the number of cylinders is increased.

Now, how can we obtain pressure? There are several methods of storing gas under pressure to drive an expansion engine. The simplest, oldest and in many ways most satisfactory method is to compress air in a light tank by means of a hand pump. For those who dislike pumping operations the tank may be filled from a seltzer cartridge by means of a little gadget used to secure emergency inflation of bike tires. We once used an old high-pressure truck tire, inflated to 80 lbs. at a local service station; rolled to the flying site it provided, by means of a detachable air-chuck, about a dozen flights. (Surplus oxygen tanks now available quite cheaply are light, strong, and would serve this purpose well.—*Ed.*)

The gas generator engine offers literally dozen of methods of securing pressure. Dry ice can be heated in a tank by means of a tiny, well shielded alcohol flame; CO_2-evolving chemicals can be mixed with a small quantity of water, and a small quantity of air and gasoline exploded by an electric spark into a larger amount of dry air will produce instantaneous pressure. However, do not attempt any of these methods without using a reliable safety-valve, and in particular do not try the gasoline exploding stunt without first calculating very carefully the proportions of the generator. *If you don't know how, don't try it!*

Steam is probably the safest thing to generate and the easiest to handle. The boiler should be strongly constructed of non-corroding metals, and baffles of some

*Although this practice is permissible where very high pressures are employed, such as in the popular CO2 engines with their four large ports, and in some types of annular ported steam engines where the sudden drop in pressure causes "condensation vacuum."

sort are needed to prevent sloshing around in flight. The steam line should be attached to the tank in such fashion that it cannot pick up water if the plane should bank sharply. The burner is best fueled with alcohol. The safest type we have found is simply a pad of asbestos wicking soaked in fuel. This removes practically all fire hazard since the fuel stays put and there are no feed lines to overheat, fracture, or otherwise cause the model to ignite. Airscoops can be used to increase the heat of the burner and, by strategic placement, carry away all heat which might be transmitted to the plane's framework.

A carefully designed steam plane is perfectly safe for free flight since it will not descend until the burner goes out. Smooth operation makes it possible to use lighter construction to improve soaring qualities.

The possibilities of steam have never been fully realized. In view of the results obtained with comparatively crude constructions we venture to suggest that if somebody with the time, money and ambition put as much engineering effort into developing a good airplane model steam engine, as has been put into development of present day gasoline engines, the steam engine would give internal combustion a good run for its money.

There are many sound reasons for this premise. First, there is absolutely no question of whether or not it will run. If you can scratch a match you can start a steam engine. Second, there are no electrical problems, no wiring, and no switches. Third, steam is quieter, cleaner, and generally easier to handle than internal combustion with its special fuel mixtures, variable compression (in the case of diesels) point clearances, cowling problems, and oil-throwing disposition.

But is steam capable of offering as much power?

We think it is, and with weights comparing favorably with internal combustion. The reasons are:

Although the steam powerplant is not as efficient—interms of B.T.U. converted to mechanical energy—as the internal combustion engine, it can quantitively convert more fuel into mechanical effort for any given displacement.

Thus, if a gasoline engine of .299 cu. in. displ. obtains a thermal efficiency of 25%, and a steam engine of the same size has an efficiency of only 10%, this does not necessarily mean the gasoline engine is more powerful even though it is 2-1/2 times as efficient. We can burn 5 times as much fuel in the steam engine and raise its power output to twice that of its rival. The amount of fuel which can be burned in an internal combustion engine is strictly limited by its displacement. Therefore, for each revolution it is practical to convert to heat only as much fuel as will give the greatest expansion of gases; additional fuel will not give additional power but will simply be wasted. The maximum gas pressure over the piston for any given stroke is limited strictly to the maximum pressure it is possible to obtain by burning a given quantity of gasoline and air.

This does not hold true for steam. Here, the pressure over the piston is limited only by how much heat is being applied to the bottom of the boiler. We can raise this limit by raising the burner temperature; that is, by forcing more air and fuel into the firebox.

Another angle: in order to get any sort

of power output from internal combustion engines they must turn over at very high speeds, speeds which it has been demonstrated are not the most efficient propellerwise. To permit high engine speeds and lower and more efficient propeller speeds, the use of some sort of reduction gearing is mandatory, bringing added weight and frictional losses. However, with the steam engine it is possible to hold the speed down with a larger propeller, of higher pitch, and let the increase in boiler pressure carry the load. What should we be able to do with props of 20" pitch, 3 to 4 times the area of today's racing toothpicks?

And—just in passing, because we have done but a sketchy amount of work on the subject—what are the possibilities of using tiny impact turbines and driving the prop at a lower speed through a magnetic slip clutch?

To sum it up, it is the writer's conclusion that there has never been a fair test of basic worth between the expansion engine and gasoline powerplants for model plane use. There is, today, a need for a good reliable compressed air motor for free flight which can be filled with a few strokes of a tire pump. The whole thing should not be over 24" in length and should be manufactured to tolerances comparing with those used for gasoline engines. In steam, there are boundless opportunities for both control and free flight. The application of cartridge gas (CO_2 etc.) to model prime movers has only been briefly exploited.

In short, the expansion engine field is one which has been but lightly and sketchily touched, with no real effort to extract the utmost performance from the basic idea.

Now, who is going to do something about it?

Stinson Voyager

(Continued from page 15)

to place. Stringers are 1/16" sq. strips of hard balsa and they are fitted into the notches provided. Cover the shaded portions of the nose with 1/32" thick planks varying the width of each as dictated by the curvature of the area being covered. An alternate method is to inlay sections of very soft balsa between the stringers and then trim the excess thickness to the shape shown. The nose block is hollowed to fit over the engine and it has a hole in the center for the shaft, 1 in the left side for the cylinder head, and 2 on the front to represent intake louvers of the real ship. The nose block can be cemented lightly to place as there should be little need to get to the engine.

On the original model the cartridge holder was attached to a piece of 1/8" x 3/8" hard balsa by binding one side of the holder tightly to the wood using thread and cement. This unit was then mounted vertically within the fuselage at the position shown; secure it firmly to the adjacent structure.

The landing gear consists of 2 wire struts on each side with a wood filler between. Bend the struts from .040" diameter music wire as shown. They are bound with thread to the fuselage and the ends soldered together. The filler is balsa which tapers in thickness from 1/8" at top to 1/16" at bottom; it is streamline in crossection. Silk or tissue is used to hold the filler in place by covering the whole undercarriage, wire and wood together. Wheels may be made from laminated discs of balsa and they should have

washers or other bearing surface fixed to them to permit free turning. Wheel pants look good but do not contribute to the plane's flying qualities so are not recommended.

Make full size plans of the right and left wing panels so parts can be assembled over them. Using the section shown, make a pattern for the ribs and then cut them from 1/16" balsa sheet. Sand the ribs uniform and cut the notches for the spars which are hard strips of 3/32" sq. The leading edge is 1/8" x 1/4" while the trailing edge is 1/8" x 3/8"; tip pieces are cut from 1/8" sheet. Tilt the inner ribs a bit for a satisfactory joint when the dihedral is added. After the cement has set, remove the wings from the plans and trim the edges to conform to the airfoil shape; then sand the structures smooth.

Tail surfaces come next and both stabilizer and rudder are of like construction. Make complete frames using 1/16" sheet for the outlines and 1/16" sq. strips for the spars and ribs. When these structures are dry, add 1/16" sq. strips to top and bottom of each rib. The ribs are later cut and sanded to the streamline shape shown.

Before frames are covered they must be thoroughly sanded to prepare for a good job. Colored tissue is used and it is attached to the frames with banana oil. Install cellophane side windows before starting to cover the fuselage. While covering the fuselage and other compound curve parts, use as many sections of tissue, carefully lapped, as will be required to prevent wrinkles. Once covered, all parts should be lightly sprayed with water to tighten the tissue but no dope is applied until the parts are assembled.

The various units may now be assembled. The front windshield is thin celluloid and a paper pattern for it must be made by the cut and try method. Set the stabilizer atop the mount in the position shown and firmly cement it fast. Then place the rudder, offsetting the leading edge to the left slightly for a right turn in the glide. Wings have 1¾" dihedral at each tip for proper stability. Wing struts are shown by broken lines over the wing drawing and they are made from 3/32" thick balsa; crossectional shape is of course streamline. The entire model is now given 1 or 2 coats of clear dope.

Numerous minor details may be added to improve the appearance without impairing the flying qualities. On the original model trim details are colored tissue and the decorations, license numbers, control surface outlines, etc., are realistically represented. Items such as cowl grill, carburetor air intake, tail wheel, foot step and the like are easily represented by scraps of bamboo and balsa. Additional details may be found on photos of the real ships for those interested in reproducing greater realism.

Commercial propellers are available or one may be carved from white pine to the specifications given. With care a more satisfactory prop can probably be made by the builder and every model maker should practice the nearly forgotten art of prop carving.

To prepare the model for flying, a cartridge is installed by slipping it within the fuselage opening beside the holder; it is then maneuvered within the holder and is ready for discharge. A cover hatch is shown by broken lines; it is optional and hardly worth while.

In flying any model, sound judgment is the greatest assurance of success. Keep this in mind and strive to get the maxi-

mum results from your efforts. Before gliding the model, check the center of gravity position by balancing it at about the 25% chord position of the wing. It should rest level; in the event it doesn't, add lead ballast at the farthermost nose or tail position. Glides should be smooth descents from shoulder height and any possible erratic performance such as stalling or diving should be corrected by further weight adjustment. First power flights should be with reduced power resulting from not launching the model until some of the energy of the capsule is expended. Power output of the motor can also be reduced by *slightly* unscrewing the cylinder. Try it 1/16 of a turn at a time until the power is suitably reduced. Minor adjustments may be made by warping the flying surfaces, wing, stabilizer or rudder. In the event glides are satisfactory but power flights have a stalling tendency, tilt the thrust line down slightly by inserting a small washer or 2 under the top lug of the engine.

The model *Voyager* is a trim little ship, keep in line and fleet in flight. It hasn't the usefulness of its prototype but it is just as much fun to fly!

Scrap Box

(*Continued from page* 3)

weighed 1 oz., was 19 in. long, had a projected span of 14-1/2 in., and a projected area of 45.46 sq. in. Surfaces were double ellipse, polyhedral wing with slight undercamber. De Castro's design was 20 in. long, with a projected span of 15-3/4 in., projected area 54.35 sq. in. Wings were double ellipse with Vee dihedral and sweepback, made from 1/4 in. soft stock with flat-bottomed section. (Do we detect the fine hand of AMA's Val "Slipstick" Luce in those area measurements?)

But the real fireworks for the day erupted at the Speed trials at the *Los Angeles Aero Modelers* model field. There's an interesting story behind this report. Howard Broughton, one of the Coast's old-timers and one of the readers who likes record news, writes: "Let's read mostly about the models and how the winner got them to fly better. The more detail on design and the more specifications quoted, the better." You've got something there, Howard, and so as not to spoil a swell account by re-writing we are going to quote your letter—

"Charles Mathews of Alameda, Calif., came down here and raised the official Class D record to 150.74 mph," begins Howard, "and his partner, E. W. Huth, topped the existing Class C record with 138.99 mph. Mathews had said he could top 150 mph. So did the Los Angeles experts who had the sleekest, most streamline models in the world. Nearly all of proven design. Many the ultimate in refinement—from the Frank Greene-Don Newberger design, which have set nearly all records for many months, to several of the metal versions of this ship developed by Ed Sharp. But none of the LA boys got up to 150 mph.

"Mathews and Huth's ships were not impressive. No super finish. Sturdy, and not much for the fancy fillets—they seemed to bulge in the wrong places. But they did break the records, with a comfortable margin to spare. There was one obvious difference—a counterweighted single-bladed propeller! This prop has a slight sweepback or hook at the tip, and undercamber toward the trailing edge of the blade. Compared to the two-bladed toothpicks it has a little more area toward the tip. The tip contour is a full semi-circle. The round shank of the blade fits into a machined aluminum hub. A new wood blade could be locked in place with any desired pitch change. As usual, the hub is covered with a 1-3/4 in. or 2 in. spinner.

"Los Angeles propeller manufacturers took a vital interest, and Ray Acord of Air-O Model Supply Co. secured an option

to manufacture the Mathews-Huth single-blade prop and hub, if further tests prove manufacture practical. Sunday, March 7, hasty flight tests were completed with the help of Don Newberger, and the first prototype prop for machine manufacture easily reached 149.75 mph. So, perhaps, a new series of speed increases lie just ahead."

Well, men, guess that's the kind of dope we all like to hear. Send it in and we'll print it.

* *

"I hope the next time I go to Dallas and listen to someone like that psychiatrist's dreamboat," begins Jim Tucker, Arkansas, whose comments on Texas doings we printed two issues back, "someone will sit me down, talk to me like a father and gently remind me what happened the last time." What's all this? Read on.

"First of all I gathered this 'information' from the owner of one of the local hobby shops in Dallas who obviously was as nutty as a peach orchard boar; and when he reads this he probably will raise more sand than the alligator did when the creek went dry. (Why not fight it out at 20 paces with ping pong balls, boys?) I understand that the Texans in Dallas are not Glo-Plug happy. I was unreliably informed by this same character that Beasley had hit 148 mph with a *McCoy 49*—I think the truth is nearer 125 mph. That 138 mph with a *Hornet* is wishful thinking. The new semi-toothpick Rev-Up is beautifully made but the fact is that, as I understand it, they are using the old Rev-Up cut down and trimmed to suit themselves. Benzol is the basic ingredient of the fuel I am now using and is hotter than any commercial fuel I have used so far. (Some druggists have been known to sell white gas for benzol and if you try to use that in any combination you are just whistling the jug.) It runs smoother and eliminates the crackling sound and gum formations common to strictly methanol base fuels. It adds considerably to the rpm's in my *McCoys*, my *Dooling*, and my *Ball*. Please give me a break on this so that my friends won't think I've given up modeling for reefer smoking."

Well, Jim, hope this makes you feel better. But did you see that 107 plus record in A made with a glo-plugged *Bantam* in Dallas? Printed it last issue. The way they told it, they sure were araving. You Dallas fellows aren't taking us in, air you?

* *

"I think I have the problem of inverted flying solved," announces Joe Lacasto, vice pres., Tri-City Modelaires, La Salle, Ill. "Some of the stunt men in our club have used this system and haven't smashed a ship because of wrong movements." What started Joe was our request for tips on inverted flying. The idea is to fly with arm fully extended. You get the ship on its back, controls neutralized, then simply lower your arm at the shoulder joint if you want the ship to come up, and vice versa. When the ship does come up, raise the arm and neutralize. "We fly 200 laps inverted with this system and never have to pick up our pride and joy," claims Joe. Thanks. We've heard others say the same thing, so maybe this confirms it.

* *

From Texarkana comes news of a revolutionary stunter by David Corley. *Hornet*-ignition powered, it spans 5 ft. and weighs 4 lbs. plus, but it easily matches lighter, smaller ships. The reason? A variable-incidence wing. Corley uses a ballbearing pivot at the front spar position and an extra pushrod that tilts the wing via a doodad at the trailing edge. It also has the usual flippers. It clips off 80 mph and with the variable wing can turn on a dime. And while down Arkansas way, we hear that *Tiger-B* glo-fuel is considered the hottest yet.

* *

That British situation is getting out of hand. Each month we get our ears boxed. If the boys can be so nice about it, we can take it. The latest blast is from the boys at the Manx Model Co., Isle of Man. Space rapidly flies south so we'll quote at random; you do the rest. "... Our (Manx) line is

COLLAPSIBLE TRAINER

Carrying models in crowded vehicles is no cinch, even if they are fairly small controlliners. Details of a model in the latter class that can be folded up for transportation will appear in July M.A.N. Use of a diesel engine eliminates the need for carrying boosters and spare ignition parts.

stunt. Our models are a bit smaller than yours, being powered with anything from a .87 cc Amco to a 2 cc E.D. Diesel . . . . loops commonplace, past verticals a mere practice piece, vertical dives and climbs a regular performance . . . . although our engines are three times as expensive as yours we chuck them into inverted flying and hope for the best. . . . Mike has busted three Mills 1.3 cc engines to date trying to knock over cigarette packages inverted (are you reading, Madman Yates?) . . . . we are still learning by trial, error, and prang . . . would like to take you up on that crack about 'just learning to design and fly free flight' . . . can think of nothing more enjoyable than meeting an American team . . . . fly all year round in weather that most likely would keep your crates in their boxes." Okay, Mike Booth, Ken Gregory, Don Emerson, we'll take it back. We, too, wish someone would start an international gas event like the Wakefield. 'Twould be sport. Forgive us those cracks, for we did have to judge your models by what we used to see in your magazines.

* *

Ted Alexander, a Massachusetts pioneer, describes an idea of interest to clubs. "We have adopted the *Leicester (England) Model Airplane Club* and are having a wonderful exchange of ideas and suggestions, and materials and supplies, besides learning to respect their problems in aeromodeling in postwar Britain," explains Ted. He handles publicity for the *Norwood Society Model Engineers* and requests contest notices to be sent to Ed Heynes, Norwood Society Model Engineers, 709 Washington, S.T., Norwood, Mass.

* *

And now for the tall story contest. For a warmup, here's a short sweet one. Walt Good was asked about the feasibility of flying radio control from Detroit to Washington with an invitation to General Spaatz to attend the Plymouth meet. . . But the one we like best comes from Charles Folk, a *Brain Buster*. (Cheer up, boys, maybe your yarn will come up later!) And this is true, for we remember reading it. Charlie quotes the United Press—

"Model Airplane Flies 365 Miles," was the head in August 29, 1943 New York papers. "The 365 mile flight of a gasoline-driven model airplane ended late yesterday when it landed in Roslyn Harbor, Long Island, and was fished out by Mrs. Edith Deakins of Roslyn Heights. A note written on the wing indicated the monoplane had been launched from Hampton, Va. The model is 4 ft. long, with a 7-ft. wingspan. Its motor automatically stops at a certain altitude, permitting the plane to drift with the wind currents." H. P. Weber, a former *Brain Buster* now back in Texas, was the proud owner of this 4-year-old beat up Playboy which turned in the "record" flight. As all modelers will guess, the *Brain Busters* were at nearby Hicksville for a contest. A mean wind and a weak thermal took Weber's ship into the water.

That's good enough for us, Charlie. Hope you enjoy your year's subscription to MODEL AIRPLANE NEWS, awarded each month to the guy with the best story.

What, we didn't use the word free-flight this month. Horrors! Maybe this will make it up to you fans. Carl Goldberg has designed a new free flight. Coming from the man who designed the *Zipper, Sailplane, Interceptor* and *Valkyrie*, this may start another revolution. There's new rules. Remember!

Freecon

(Continued from page 25)

ally strong; nothing was sacrificed to save weight and the entire model was color doped to a good finish. The crossection is a little large compared to what a lot of the fellows are using under the new rules, but this does not seem to hinder the model's flight in any way, for its usual time is higher than the average ship is able to do. It grabs plenty of altitude while under power, to enable the glide to really stretch out.

There was no trouble encountered in

flying the model, with the exception of vibration caused by bumping the fuselage when starting the motor. This was handled by adjusting the relay points.

While designing the model, and during its construction, all effort was spent in trying to make a model that would be easy to service, light in weight, stable in design, with no conflicting adjusting surfaces, no electrical troubles, and a model strong enough to take the beating required of it in contest flying, for it is expected to fly in a lot of contests! Consequently there are hatches for easy access to the receiver and the "B" batteries. The escapement is mounted directly under the vertical tail, where it is easy to get to when the horizontal tail is removed. The "A" batteries and the escapement batteries are in boxes which open to the side, and the antenna is mounted outside the fuselage. To some of you this may not seem to be the proper place for the antenna, but there has been no difficulty encountered from this mounting. It was placed there for ease of maintenance, and since it works all right it was left there.

Although there was no wood spared in constructing the *Freecon*, the wood used was placed where it would do the most good and was carefully picked for size and weight. The fuselage is planked with sheets of 1/8 inch balsa, fairly hard, then covered with parachute nylon. The wing has 3 large spars of very hard wood as well as big leading edges and trailing edges; the horizontal tail has a full depth spar and each rib is gussetted to keep warps at a minimum. The half inch square hollow spar for the vertical tail encloses the rubber power supply for the escapement. The ribs were from 3/32 sheet, flush with the spar, then capped with 1/16 to 1/4 balsa. The landing gear was equipped with 2 inch solid rubber wheels to protect the receiver from hard landings, and with this gear the model makes surprisingly good landings.

The hinges for the rudder were made from 1/32 dural, drilled to take .040 wire. The hinge pins were imbedded in the leading edge and the shank allowed to move freely. Every effort was made to eliminate all possible slope from the control surface since it was deemed necessary to keep the rudder in a strictly neutral position while under power; this has turned out to be the correct position for power flying since the model flies fast during the climb. The control arm was bent from 1/16 music wire, and the channel which the escapement pin runs in is a very close fit. Particular care was spent in bending the slot so it would provide a good sliding fit, with no loose or tight spots during the complete cycle. This allows the escapement to run smoothly and to provide a positive rudder movement throughout the action.

The rudder can be trimmed in any direction by bending the control arm in the direction desired. This allows a tight circle in either direction desired or will provide circles of equal diameter. It has been found that it is practical to have the circle much tighter in one direction than the other so that the model could be put in a near spin glide to bring it down fast. Recovery from this near spin glide is made by merely returning the rudder to neutral and then in the opposite direction. Spins on different models may vary a little, but recovery should be fast and positive or the control forces will build up until they are too high for the rubber escapement power to counteract.

The complete receiver unit was installed in the plane, suspended from 2

hardwood uprights with 1/8 inch rubber. The uprights to which the wire hooks were suspended were 1/8 plywood, firmly cemented and gussetted in place to withstand the full of the rubber. The rubber was fastened from the hooks thru the fahnstock clips on either end of the receiver and then back to the hooks. This type of suspension mounting is very practical and simple to install, but was used in lieu of the 10 oz. Lord mounts which were not available at the time of construction. The Lord type mounting should prove to be the better for an instrument as sensitive as the receiver for they provide metal to metal surfaces for the screws, as well as a very flexible rubber diaphragm to absorb all shocks. They are available for practically any weight desired to mount on and are fairly cheap.

The battery box for the "B" batteries was constructed from 1/16 plywood with the ends re-inforced with 1/8 inch hard balsa. The contacts are spring brass. The batteries are firmly held in place with a long machine screw which goes thru a top clip of 1/32 brass to a nut cemented to the bottom of the box, between the batteries. The "A" batteries mount in a box in the side of the fuselage, constructed in much the same manner as found in most gas models. The escapement batteries and ignition batteries are similarly mounted.

The complete wiring system of the model was color coded so as not to get the wires mixed up. It is advisable to do this on all radio jobs, for you have so many different voltages that it is perfectly possible to run too much current to the wrong place and burn up some section. A double pole single throw switch was installed so that the batteries could be turned off when the set was not in oper-

WYLAM FANS

Followers of Bill Wylam's fine drawings will be interested to know that details of the German MERCEDES ENGINE will appear in July M.A.N. This engine was used in the Pfalz D12 (the series of which is concluded in the present issue) as well as in many other German World War I fighters.

ation. It is advisable to mark all the battery boxes for polarity to avoid confusion.

There were 2 changes made to the stock transmitter which in the author's opinion improves its operation. The first was a Micro-switch in parallel with the control operation switch on the box. This was hooked-up with about 5 feet of wire so one can stand upright while flying the model. The other change was a calibrated geared dial with a locking device which allows very close tuning and locks in place.

Since the commercial units are not complete with antenna poles it is necessary for the operator to construct his own. The first poles used in this transmitter were constructed with wood and swayed in a slight breeze. It was thought that perhaps extruded aluminum channels or angles would be better, so a search of the war sulplus houses started. At first we found the ideal material, one-half inch square hollow tubing. The walls were 1/64 inch thick. A small triangle of .051 dural was used to bolt to either of the two sections. The result was a very sturdy and light antenna support.

The flying qualities of the model are excellent, having the fairly fast climb needed for contest work and a glide which is flat and seems to hang-up and never want to come down; it really floats, making is very easy to control. The rudder is easy to trim by bending the control rod in either direction you desire. With the present model flying the way it is, we are able to get a good tight left circle, almost a spin, merely by hitting left rudder. If one wants a large right circle, hit the controls twice from left position, the first being to neutral, the second to right rudder. When the rudder is in this position the circle is fairly large, being almost straight. To bring it back overhead, it is only necessary to hit a series of control deflections until the model is traveling in the direction desired and then gliding with right rudder most of the time; the few instances when left rudder or neutral is used are only to bring the model back on the correct path.

It is fairly easy to lose altitude fast with a series of control deflections from right to left—not real fast deflections, but ones where you watch the model and time your signals until a semi-'fish-tailing' effect is obtained; this isn't the violent maneuver obtained with real planes since we have so much effective dihedral and so small a moving surface.

Low power maneuvering flights can be made by trimming the model to fly straight with neutral rudder. On the occasions that the model was flown and controlled under power, the timer was tied back so that the motor would run itself out. The model handled very easily and responded to the control deflections at will. One word of caution about these power flights as well as all other controlled flights: get plenty of altitude before attempting maneuvers until you are experienced with your model's characteristics. Try to make all your low altitude turns into the wind so the model will have plenty of lift when you bring it out.

All that is necessary for good efficient operation of the radio equipment is to follow the instructions with your set and you will have an easy time with your first radio controlled model—a little more complicated than the usual gas model, but one which will provide you "endless joy" in flying! One last word to the wise: get a "ham" to operate your set for you, or to stand by while you are flying!

Air Ways

(*Continued from page* 31)

Switzerland) is a *De Havilland Vampire* of 4 ft. wingspan. It contains a jet engine which works only during flight, therefore the plane needs aid in launching, which is attained with a powder rocket. The plane has a speed of 125 mph. Max Dreher (Utlibergstr. 92 Zurich, Switzl.) is the designer and builder.

Yogi in No. 7, built by Philip Hmiel (629 Park Ave., Syracuse 4, N. Y.) is powered by an *Ohlsson 23* and weighs 21 oz. The color is maize yellow and Stinson red.

Lynn W. Christensen (518 E. 134th St., Hawthorne, Calif.) built the channel wing ship shown in No. 8. This odd design is powered by an *Ohlsson 23* and has been flown many times. Powered flight is very good but the glide (Lynn says . . "if you can call it a glide") is steep. The model is ruggedly built, however, and has not been damaged by hard landings. It weighs 2 lbs. and will fly at a 30° angle under power before stalling.

No. 9 is an original CO2 powered pusher plane by Leonard A. Savastio (Price Hall, Lehigh Univ., Bethlehem, Pa.). It has a 3 ft. wingspan and is powered with an *OK CO2* motor inverted. The motor is mounted 4" above the wing trailing edge. Contrary to the motor manufacturer's instructions, the capsule is mounted horizontally, and considerably below the cylinder—this mounting has no deleterious effects on the engine's performance. Maximum flying time was 30 sec., and the ship has proved to be rather an erratic flyer so far.

Miles Magister seen in No. 10 was constructed by Oral G. Sizemore (Thatcher Hall, Central State College, Edmond, Okla.) from plans in Feb. 1942 M.A.N. This model made several fine flights of 45-90 sec. duration. It is covered with Jap tissue, was given two very thin coats of clear dope and is trimmed with light red.

Walter Fitch (Canandaigua, N.Y.) has built over 500 models since 1912 and claims that his *Spitfire* shown in No. 11 is his best scale job to date—due largely to Wylam's drawings from which he got a wealth of valuable details.

No. 12 is a Class C cabin model by Chet Smith (185 Ashland Rd., Holliston, Mass.) who states that the ship has not been tested yet due to poor flying conditions in his section of the country.

NEWS OF MODELERS

Rolf Laue (24a—Hamburg 20, Hegestr. 19, Germany) is anxious to correspond with an American modeler and will exchange German stamps for copies of Model Airplane News.

J. A. Beaton (Meldon, Station Road, Buchlynie, Stirlingshire, Scotland) is 18 years old and is eager to acquire a pen-friend regardless of age who will exchange magazines, etc.

Louis Zook (R.R. 5, Franklin, Ind.) 13 yrs. old, is mainly interested in control line speed and beauty. He would like to answer letters in his spare time.

Roger Deleporte (5F Ave. Bailly Ducroquet, Sambersart, Nord, France) would like to contact a model builder who is interested in motors and experimental models.

D. Dolfenden (c/o Mrs. McCann, Roberts Road, Belmont, Geelong, Victoria, Australia) would like a pen-friend interested in all lines of model aircraft, preferably glider and rubber driven.

Billy Steffey (Rt. 5, Staunton, Va.) aged 16, is anxious to correspond with

International Model Speed Contest

FINALS TO BE HELD AUGUST 2-3-4
at "International Air Exposition"
N. Y. CITY INTERNATIONAL AIRPORT (IDLEWILD)

any modelers interested in scale models.

Drum Major Pattenden 6287291 (D. 2 More Manied Qrts. Shomcliffe, Kent, Eng.) desires to contact gas modelers about 26 yrs. old who would be interested in exchanging plans, kits, books, etc.

H. L. Krasovido, AMM 1/c USN. (Bldg. 143, Apt. I-2, Naval Air Station, Alameda, Calif.) saw a photo of a friend of his, Edward Simpson, in the *Club Views* section of M.A.N. Mr. Krasovido is anxious to have Mr. Simpson contact him and renew their old acquaintance.

Alan Indge (15 Oaklands Avenue, West Wickham, Kent, Eng.) wishes to correspond with an American about 21 yrs. old interested in U-control, free flight gas and with a further view to exchanging magazines and some merchandise.

John M. Wray ("Danby" 23, Whitethorn Lane, Letchworth, Herts. Eng.) would like any old free flight or control line plans that could be powered by a .199 *Arden*. He also is seeking a pen-pal about 17, having similar interests in model building.

Peter C. Wood (6 Gipsy Rd., Leicester, Eng.) would enjoy corresponding with an American in order to exchange books, plans, etc. He is mainly interested in control line stunt and free flight.

Keith A. Mathison (Round Hill, Alberta, Canada) would like to receive letters from modelers all over the world. Control line and scale models are his favorites, but he would be willing to discuss free flight, glider, solids, etc.

D. Franklin ("Oakdene," Perry St., Billericay, Essex, Eng.) wishes to exchange the "Aeromodeller" for copies of M.A.N.

Aircraftsman M. Gough, 3111037 R.A.F. (Windrush, Wayside, Chipperfield, Herts. Eng.) would like to exchange English magazines for copies of M.A.N.

C. S. Ward (11 Havering Rd. Romford, Essex, Eng.) is an ardent model fan who is seeking an American pen-pal to exchange plans, etc.

Jochen Turke (Braunschweig, Goethestr. 5, Germany) is a German modeler who would like an American pen-pal. He is 22 yrs. old and is especially interested in free flight gas models and radio control.

CLUB NEWS

California

COMING CONTESTS

May 16—Stockton Free Flight.
May 16—San Diego Free Flight.
May 23—Ukiah U-Control.
May 23—Colinga Free Flight.
May 30—Ninth Annual West Coast Championship Free Flight, Fresno.
May 30—Hy-Flyers Free Flight and Control Line.
June 6—San Francisco Vulture Hydro.
June 6—Los Angeles Free Flight.
June 11—Richmond U-Control.
June 13—Fresno First Annual U-Control.
June 13—Marin Co. U-Control.
June 13—San Rafael U-Control.
June 20—Newman U-Control.
June 20—Los Angeles Free Flight Contest at Naval Air Station.
June 25—All Western Open, Los Angeles.
July 25—Visalia U-Control.
Aug. 1—Sacramento Skyoneers Free Flight.
Aug. 15—Santa Barbara Free Flight.
Aug. 22—Palo Alto U-Control.
Sept. 19—Vallejo Sky Jockeys.
Oct. 3—Sacramento Free Flight.
Oct. 10—San Diego U-Control.
Oct. 17—Thermal Thumbers Outdoor rubber stick and cabin.
Oct. 17—Gilroy Free Flight.
Oct. 17—Las Vegas Nevada U-Control.
Oct. 17—Los Angeles Outdoor rubber stick and cabin.
Oct. 24—Los Angeles U-Control.
Oct. 31—Fresno Semi-Annual Free Flight.
Nov. 7—East Bay Aeroneers Free Flight.
Nov. 21—Los Angeles Semi-Annual Free Flight.
Nov. 28—Ontario U-Control.
Dec. 12—Los Angeles Jr. Free Flight.

* *

On Jan. 7 a new model club was formed

DETHERMALIZERS—

Under the new rules it is no longer necessary to lose your ship to win a meet—no times over 10 minutes are counted. Dethermalizers should now come into their own, and our July issue will supply details of a sure-fire design. Don't miss it!

in Sacramento with 10 charter members present. The new club is called the *Sacramento Model Research Association.* T. Van Dyke was elected Pres.; W. D. Russell, Secy.-Treas.; Clifford Lawrence, Contest Direc. Sunday flying sessions have already been set up.

* *

The *Fresno Gas Model Airplane Club* and Fresno Exchange Club are sponsoring their 9th Annual West Coast Championship Free Flight Model Airplane Meet on May 30.

* *

Here are results of *Tulare Sky Kings* Contest held Feb. 15:

Class A—1. Fred Mossier 8:33; 2. R. Wacher 8:17: 3. Earl Ford 8:04.
Class B—1. D. VanTassel 13:23; 2. Jack Crose 12:23; 3. Fred Mossier 11:26.
Class C—1. Eddie Marbet 15:00; 2. Bud Chapman 11:32.8; 3. Jack Crose 11:15.5.

The *East Bay Aeroneers* held their first club contest under the new A.M.A. rules on Jan. 11. The winners:

Class A—Hubbard Jr. 1:36.
Class B—Bill Steese 2:15.
Class C—J. Valponi :51.3.
Class D—1. Russ Watkins 10:54; 2. Jim Liebee 8:48; 3. Don Foote 7:51.

Yearly trophies for 1947 presented to: *Junior*—Walt Hubbard; *Class A*—Jack Valponi; *Class B*—Bill Steese; *Class C*—Charles Hubbard.

* *

New officers for *Sacramento Skyoneers Model Airplane Ass'n* are: J. Johnson, Pres.; L. Perisich, V. Pres.; M. Bertoluccie, Treas.; Julia Perisich, Secy; E. J. Buckner, Sgt. at Arms; Willie Yee, Sentinel. The *Skyoneers* will hold their annual free flight contest Aug. 1. More details to be given later.

* *

Roscoe Low advises that he has been elected Pres. of the *Falcon Model Airplane Club,* with Al Ayersman, Vice Pres.; Bud Nalley, Secy.; Richard Erickson, Contest Direc.; Bob Henry, Publicity Man. The latest addition to the *Falcons* is a trailer to be used for attending meets. The club is already laying plans for their big contest for free flight models in Santa Barbara on Aug. 15.

Connecticut

COMING CONTESTS

June 26—Branford Sky Wolves Control Line meet.

The *Branford Sky Wolves Model Airplane Club* of Branford are holding their 2nd annual control line meet on June 26 at Hammer Field. Again this year Corcoran Sundquist Post No. 83, American Legion is the sponsor.

Florida

Lakeland Model Airplane Club has changed its name to the *Exchange Aero Club.*

* *

Results of Miami Mid-Winter Model Meet held Feb. 28-29:

Junior

Class A—1. James Monroe 80.35; 2. Charles Gray 69.23; 3. Edward Mercado 64.28.

Senior

Class A—1. W. T. Thomas Jr. 98.90; 2. J. R. Brannon 81.52; 3. Marston Hailett 75.00.

Open

Class A—1. Cecil Wethy 105.88; 2. August Jacobs 98.90.

Junior

Class B—1. Charles Gray 94.73; 2. Ronnie Sharpton 85.71; 3. Clark Wayne 53.73.

Senior

Class B—1. (Team) Wayne Austin and W. T. Thomas Jr. 109.09; 2. Sam Price 108.43; 3. Richard Buchanan 106.50.

Open

Class B—1. August Jacobs 90.90; 2. Cecil Wethy 88.83; 3. Wallace Tough 81.81.

Junior

Class C—1. Gene Rosenthal 93.26; 2. Charles Gray 90.90; 3. Peter White 67.41.

Senior

Class C—1. George Brunch 117.64; 2. Wallace Smith 114.64; 3. Lester Baynard 110.42.

Open

Class C—1. Jacobs 117.64; 2. John Muir 112.00; 3. W. T. Thomas. 110.42.

Junior

Class D—1. Gene Rosenthal 113.92; 2. Kenneth Mattingly 84.11.

Senior

Class D—1. Robert Gardner 109.09.

Open

Class D—1. W. T. Thomas 133.33; 2. August Jacobs 130.43; 3. John Muir 124.13.

Stunt Jr.

1. Bert Parker; 2. Wilson Larkin; 3. Sy Vasgerau.

Team Flying

1. Antoinette & Basgerau; 2. Larkin & Hock.

Flying Scale

1. Stoia & Maggio; 2. Vernon Ottoway.

Indiana

COMING CONTESTS

May 2—Legion Roundup, Weir Cook Airport, Indianapolis.

May 16—Hoosier Capitoliners Exchange Club Contest, Indianapolis.
May 30—Purdue Speed, Stunt and Scale.
June 13—Anderson Johnnies Free Flight.
July 11—Clinton Speed Stunt Scale.
July 17-18—Legion, Indianapolis Star.
July 25—Portland Free Flight Contest.
July 25—Terre Haute Speed Stunt.
Sept. 5—Indiana Gas Model Assn. Free Flight, Indianapolis.

* *

On July 25 a free flight contest will be sponsored by the *Portland Jay Birds.* A $250 prize list will be offered. This contest will be open to all in classes A, B, C, and D in free flight only. U-Control exhibitions will be welcome as in past years but no competition will be flown. Contest site will be Steed Field which is one mile north and a half mile west of Portland. Address all inquiries to Wm. D. Hutchins, 122 N. Munson St., Portland.

* *

The *Hoosier Capitoliners* have gained 18 new members since January. Anyone interested in building and flying models in Indianapolis is urged to contact the Club Sec'y, Benny Stellhorn, Fr. 7942.

* *

Following are the newly elected 1948 officers of the *Indiana Ass'n of Model Airplane Clubs:* Dirk deBruyn, Pres.; Harold Tremps, Vice Pres.; Glenna Williamson, Sec'y; Frank Vollrath, Treas.; Kenneth Kimmel, Contest Direc.

Iowa

COMING CONTESTS

July 3—The Tall Corn Model Airplane Meet in Des Moines.
July 11—Storm Lake Flying Club.
Sept. 3—Wallace Blake Free Flight and Control Line Meet.
Sept. 5-6—Second Annual Model Meet at Waterloo.

* *

Dick Kulaas, Secy. of *Decorah Skymasters* informs us that this club is planning a control line meet for July 18 or 25. Other officers of the club are: Roger Wesehmann, Pres.; B. H. De Witt, Adviser.

* *

The *Waterloo Prop-Twisters* are holding their 2nd Annual Model Meet in Waterloo, Sept. 5-6. The meet is AMA sanctioned and $1,000 in prizes will be offered. Requests for information and entry blanks should be addressed to: *Waterloo Prop-Twisters,* P.O. Box 2456.

*

The *Storm Lake Flying Club* will hold a contest July 11 at Storm Lake Airport. Will include 18 U-control events; A, B, C, D. Speed, Jr. and Sr.; Stunt, Jr. and Sr. For further information contact Bob Olson, 536 Grand Ave., Storm Lake.

Louisiana

The 8th Annual Gulf States Model Airplane Meet is again scheduled for this year. Tentative date is the middle of July, and it will be jointly sponsored by the Louisiana Wing of CAP and the *New Orleans Aero Club.*

Maine

Members of *The Propsnappers Model Airplane Club* recently elected the following officers: Howard Tisdale, Pres.; Harry Savage, Vice Pres.; Malcolm Kennedy, Treas.; Edith Banks, Secy. The club publishes an interesting paper called *Propsnappers Monthly Exhaust* and would like to exchange papers with other clubs.

Massachusetts

The *Rocket Raiders* is a newly organized club in Brookline specializing in Free Flight and U-Control.

Mississippi

COMING CONTESTS

June 19-20—Delta States Model Airplane Meet.

* *

The *Clarion-Ledger* newspaper, in co-operation with the American Legion and the *Jackson Model Airplane Club*, will sponsor the 5th Annual Delta States Model Airplane Meet (AMA sanctioned) on June 19-20.

Montana

The *Silver Eagles Model Club* is going forward with plans for an inter-club contest of U-Control and Rubber Power. The club is run on a non-profit basis and members publish a newspaper called the *Silver Eagle News*. Club officers are: Raymond Dugdale, Senior Advisor; Joe Forbs, Pres.; Cleon Gunderson, Vice Pres.; Becky Forbs, Secy.; Frank Jones, Treas.; Delbert Rodriques, Corres. Secy.

New Jersey

COMING CONTESTS

June 20—9th Annual Model Airplane Contest by the VINELAND AERONAUTS.

* *

The Vineland Chapter of the Exchange Club is backing the *Vineland Aeronauts* 9th Annual Model Airplane Contest to be held June 20 at Millville Municipal Airport.

* *

The *Air Knights* held a hand launched glider contest on March 12 and, despite high winds and crackups, a fine time was had by all. Richard Dreps won with a time of 38 seconds; runner up was Bill Wilson. The club, organized in January, is having a membership drive and anyone interested may contact Richard Dreps, Pres., Baldwin Ave., East Keansburg, or Fred Bettiger, Secy., 30 Beacon Blvd., Keansburg. Meetings are held at Richard Reamer's, 7 Pinewood Ave., West Keansburg.

New York

COMING CONTESTS

June 6—N. Y. Mirror Model Airplane Meet.
June 11—Queens Thermal Thumbers 3rd Annual Contest.
June 20—Second Annual Open U-Control Contest, Freeport, L. I.
June 27—Ninth Annual Invitation Model Airplane Derby.
June 30-July 11—Fifteenth National Soaring Contest.
Aug. 15—Free Flight Gas Powered Model Contest at Valley Stream, L. I.
Aug. 22—Long Island Skyscraper Meet.
Sept. 19—Brooklyn Record Reckers.

* *

The *15th National Soaring Contest* for full size gliders will be held at Harris Hill, Elmira, from June 30-July 11. It is sponsored by the EASC and sanctioned by the Soaring Society of America.

* *

The *Lindenites Model Airplane Club* is seeking prospective members. The club meets every Thursday at 9 p.m. at 683 Wyona St., the East New York section of Brooklyn.

* *

On Sept. 19 the *Brooklyn Record Reckers* will hold an AMA sanctioned meet at a new field to be announced shortly. Prizes include trophies, motors, tools and kits, etc. The following officers were recently elected for 1948: Mel Menkin, Pres.; Bill Temkin, Vice Pres. and Treas.; Bernie Furgang, Secy.

* *

Fred Wittmeshaus writes that the *Queens Aero Model Assn.* is looking for new members. For further information contact Fred at 32-86 30th St., Long Island City, 2.

The *Screamin' Demons* elected the following officers: Bill Davey, Pres.; Joe Pira Sr., Vice Pres. & Corres. Secy.; Harry Linnemeyer, Secy.; Eugene Rogers, Treas.; Bill Johnke, Contest Direc.; Tommy Tourt, Publicity Chairman. The *Demons* are planning a big contest to be announced soon.

* *

Exact location of the *Skyscraper Meet*, Aug. 22, will be announced at a later date.

* *

The *Long Island Gas Monkeys Model Club* is holding a free flight gas powered model airplane contest in conjunction with the Rosedale-Laurelton American Legion Post on Aug. 15, at Valley Stream, L.I.

* *

On March 5 the *Flying Bisons* elected these new officers for 1948: Gordon Greenley, Pres.; Al Mueller, Vice Pres.; Leonard Wagner, Secy.; Norris Maltby, Corres. Secy.; Ronald Kirk, Treas. At their March 12 meeting, the *Bisons* held a workmanship contest to encourage members to do better work more often. Winners: Norris Maltby with a *Bantam* powered scale model *Folkerts Racer;* Bob Rawe with a *McCoy 49* powered *Dmeco Speed-Wagon;* Vince Chimera with a new *Ohlsson 60* powered stunt ship; and Jim Miller with an *R. B. Special* powered Class B *Speedwagon.* For further details about this club write *The Flying Bisons,* 95 Mariemont Ave., Buffalo.

* *

For the second successive year the *Schenectady Union-Star* joins with the *Schenectady Aeroneers Model Airplane Club* in presenting the 9th annual invitation model airplane derby. The *Union-Star* is putting up $550 in prizes for the gala event which will be held from 9 a.m. to 5 p.m., June 27, at Schenectady County Airport. In addition to the regular glider, free flight and control line events, a new feature will be a special event class for CO2, jet and radio control model planes. Prizes will include motors and a complete line of model plane accessories plus 3 championship trophies and smaller trophies in many of the 17 events. Also, prizes will be offered down to 6th and 7th places in most classes. Entry in the derby will be limited to members of the Academy of Model Aeronautics. Entry blanks can be obtained from A. Pickney, Contest Director, RD 4, Vley Rd., Box 210, Schenectady. There will be no admission fee.

North Carolina

COMING CONTESTS

June 20—Third North Carolina Free Flight.

* *

The *High Point Model Master's club* are holding the 3rd North Carolina Free Flight AMA sanctioned Championship Contest on June 20. The Carter Allen Trophy will be awarded to the high point winner as the highlight of the meet. Events will consist of all Free Flight classes (A, B, C & D) and one appearance event.

Ohio

COMING CONTESTS

June 13—Free Flight and U-Control, Findley.
June 20—Free Flight, Toledo.
June 27—U-Control and Free Flight, Cincinnati.
June 27—Akron, All Classes.
July 3-4—Cleveland Jr. Air Races.
July 25—Warren.
Aug. 1—U-Control, Cleveland.

* *

New officers of the *Cleveland Balsa Butchers* are: Chester D. Lanzo, Pres.;

Harold H. Woods, Vice Pres.; Paul Bartel, Secy.

Oklahoma

COMING CONTESTS

May 15—Spartan Model Association U-Control and Free Flight.

* *

The *Spartan Model Association* is sponsoring a U-control and free flight meet for Tulsa and the surrounding territory on May 15.

Oregon

The *Fireballs* held their first contest on Feb. 15 at Westmoreland Park. The results:

Stunt Event

Jr.—1. Jack Hudspeth 78 pts.; 2. Don Roberts 53; 3. Bob Shaw.

Sr.—1. Norm Holland 66 pts.; 2. Chuck Hollinger 62; 3. Harvey Hartmann 49 and Dan Hudspeth 49.

Cross-Country

1. Dan Hudspeth 6 min. 41.5 sec.; 2. Dick Nichol 3 min. 43 sec.; 3. Lyle Ellis 1 min. 58 sec.

Junior Speed

Class A—1. Jack Hudspeth 73 mph; 2. Raymond Arrigotti 64; 3. Bob Hammond 55¼.

Class B—1. Jack Hudspeth 102½ mph; 2. Martin Arrigotti 81½; 3 John Fuez 72¾.

Class C—1. Jack Hudspeth 109 mph; 2. John Fuez 79½.

Class D—1. Thomas VanVene 88½ mph.

Senior Speed

Class A—1. Orville Teters 75 mph; 2. Bob Kern 72; 3. Wally Sutherlin 65¼.

Class B—1. Gerald Thomas 90 mph; 2. Harvey Jensen 88; 3. Fred Bishoff 84½.

Class C—1. Ralph Flaaten 120½ mph; 2. Gerald Thomas 102.

Class D—1. Ralph Flaaten 125 mph; 2. Jud Fuller 115; 3. Don Sullivan 110.

Pennsylvania

COMING CONTESTS

May 2—Lansdale Junior. Chamber of Commerce 1st Annual Gas Model Meet.

May 31—Free Flight—Philadelphia Flying Circus.

July 5—Control Line—Philadelphia Flying Circus.

Aug. 1—Third Annual Gas Model Meet.

Aug. 29—Doylestown Kiwanis Club and Kiwanis Aero Club Contest.

The Kiwanis Club of Doylestown accepted the sponsorship of a 52-passenger bus that was recently donated to the *Kiwanis Aero Club* as a gift from the Huntingdon Valley Hunt.

* *

The *Philadelphia Gas Model Assn.* chose the following as winners of the 1947 season—free flight gas: 1st—Pat Cambrello; 2nd—Vince Ranzino; 3rd—Joe Wallace; 4th—Lloyd Kennie; 5th—Jim Ivan. Any interested builders can

contact Jesse Bieberman, 21 Dartmouth Rd., Cynwyd, Pa. or Ronald Shepherd, 3434 N. 7th St., Phila. Indoor flying is held in the 108th Armory in Phila.

* *

The Lansdale Junior Chamber of Commerce received sanction for its 1st Annual Gas Model Meet to be held May 2, Gloster Airport. First event starts at 12 noon, registration from 10:30 a.m.

* *

The *Exchange Club of West Chester* received sanction for its Third Annual Gas Model Meet on Aug. 1, at the West Chester Airport.

Canada

COMING CONTESTS

July 11—10th Annual International Model Aircraft Meet.

* *

The *Windsor Model Aircraft Club* will sponsor the 10th Annual International Model Aircraft Meet at Windsor on July 11—rain date July 18. Prizes will be trophies, motors and merchandise. The events to be held are: Classes A, B, C, D, Free Flight Open; Combined Classes Cabin Rubber and Towline Glider. For further information write: *Windsor Model Aircraft Club*, c/o James W. Graves, 1555 Church St., Windsor, Ontario.

* *

Since the *Kerrisdale Model Aircraft Club* has disbanded most of the members have joined the *Vancouver Gas Model Club* which is one of the most active clubs in Canada and boasts a membership of over 200.

Honolulu

The American Legion Control Line Contest was held Feb. 28-29. Harry S. Gima came through with flying colors in the open speed event, taking first places the Classes B, C & D. The Higa brothers, Jinji and Jinichi, won honors in the workmanship event, with L. Y. Farm runner up.

Build Your Own Diesel

(*Continued from page 32*)

"cylinder" (Part I), lap to size. (Never lap a piston in its cylinder or you will have a very sloppy fit.) Cut off the piston and using a V block to hold the piston, drill and ream the piston pin hole; carefully remove all burrs. File the deflector on the piston, then coat with oil to keep from rusting.

PISTON PIN—Turn from hard bronze to a tight fit in the piston. Round both ends with emery paper and polish with crocus cloth.

CONNECTING ROD—Obtain a piece of 1/4" flat steel stock. Lay out and center punch for the 2 holes. Be very careful; extreme accuracy is required here. Drill and ream the holes. Scribe outlines for the finished piece on top and sides. Clamp in your vise and file to 1/8" thickness, being careful to stay clear of the 2 end bosses. File exactly to scribed lines. Using Swiss needle files shape bosses and smooth the entire rod except for the bores. Polish with emery paper. Check for fit on the piston pin and crankshaft.

CRANKSHAFT WASHERS—Turn the drive washer as shown from steel. Drill a 1/4" hole while in the chuck. File out the square, checking constantly by fitting the washer on the crankshaft. The front washer may be a standard 1/4" bore steel or brass washer, or you may turn one of aluminum as shown on the drawing. A regular 1/4-28 hex nut is used to hold the propeller and can be obtained from

any hardware store or model shop.

NEEDLE VALVE—An Austin needle valve gives good service and saves time as this is a tricky item to make. Use Neoprene tubing for the gas line.

BY-PASS AND EXHAUST PORTS—Form the by-pass and exhaust of tin can metal and clamp them in place. File and drill the intake tube, squeezing the end to fit the inlet on the cylinder and clamp this piece in place also. Tin all edges with a small soldering iron and acid core solder. Try only to place the solder with the iron. Then, using a small blow torch or gas flame, flow the solder along the edges to form a perfect seal. *Cool slowly* and remove clamps. Let hot water run on cylinder to remove acid flux and coat with heavy oil.

ASSEMBLY—Lubricate all parts where friction occurs. Fit the crankshaft into the crankcase; then assemble piston, pin and rod and attach to crankshaft. Fit the cylinder to crankcase and screw in place. Turn the crankshaft over several times to make sure all parts work smoothly and do not clash or bind. Next fit the contra-piston and cylinder head. Pour a little oil into the exhaust port and turn the motor over by hand (or slowly by power) to loosen up the working parts a bit. Disassemble and wash all parts thoroughly in gasoline.

Reassemble motor carefully, fitting paper gaskets where necessary. Be sure the by-pass and deflector side of the piston are in line. Attach the rear cover plate and tank, and the needle valve and fuel line. Lugs may be made of aluminum angle and attached to the upper part of the crankcase by machine screws.

Mount your motor and attach the propeller. Pour a few drops of oil into the exhaust port. Release the compression screw. Use a fuel mixture composed of 50% ether, 50% mineral oil, with a few drops of SAE 70 oil added. Ether and kerosene also work well but more lubricating oil must be added.

Prime the motor and turn down the compression screw. Flip until the engine fires. Adjust needle valve and release compression screw until smooth running is obtained.

If readers want any points of construction or operation clarified we will be glad to help. We would like to hear from any who build this engine; let us know how you make out and how the engine operates.

Sky Queen

(*Continued from page* 11)

nose and tail. Give all fuselage joints an added coat of thin cement, and lay aside for covering.

WING—Due to the great skill and patience necessary to build a multi-spar wing in one section, I would advise the average model builder to make the wing in 3 separate sections as shown on the plan. Pin trailing edge and wing tip parts down to the plan, remembering to place small scrap pieces of 1/32" balsa under the front of the trailing edge. The second bottom spar back from the leading edge is also pinned down to the plan. The wing ribs are cut from 1/20" or 1/32" sheet balsa, preferably quarter grained stock, then cemented in place. The top spars, leading edge and remaining bottom spars are now cemented in place. Be sure to set the root rib of the outer section at an angle so that when it is butted to the tip rib of the center section it will give the proper dihedral.

RUDDER & STABILIZER—The rudder

is constructed from a light grade of balsa and is made by pinning all necessary parts directly down to the plan. The trim tab is held in place with 2 thin strips of aluminum (approx. 1/16" x 1/4"). The stabilizer is made similar to the wing and no trouble should be encountered.

PROPELLER—The performance of any model can be traced directly to the propeller. No matter how well you have built your model it isn't worth two hoots if you haven't a good prop churning away out front to give the maximum amount of thrust for the power used.

Little can be said about the actual carving of the prop except that a good grade of light but firm balsa wood should be used, along with care and patience. It will be helpful to have a prop before you that has been carved by an expert. You will notice that the propeller hub is the same as those in popular use today, with the exception of the hinge. We have substituted a short length of brass tubing soldered to the rear hub guard. The size of the tubing selected should be a snug fit over the wire fitting (approx. .062). I suggest that you fellows who are capable of carving a good prop give the younger boys a hand. Year after year we attend contests and see beautifully constructed models, capable of topnotch performance, equipped with a prop that looks as though it was cut out with a dull axe. We have everything to gain by helping out these lads and certainly nothing to lose.

COVERING—The original *Sky Queen* was covered with pre-war tissue. The fuselage was double covered (cross-grained), water tightened, and given 3 coats of thin dope. The wing and tailplane were single covered, with grain of the tissue running chordwise, and then treated same as the fuselage.

FLYING—Careful testing in calm air is required to get maximum performance from your model. First adjust the glide by moving the wing back or forward as required. The rudder should offset to the right approximately 3/32". Wind about 150 turns into the motor (24 strands of 3/16 flat or 36 strands of ⅛ flat rubber 36" long) and launch the model into the wind. Any signs of a stall should be removed by adding downthrust to the nose block. A little right thrust should also be added to the nose block to keep the model turning to the right under power as well as in the glide.

It should be kept in mind that contests are seldom won on the contest field, but during the weeks and months of test flying prior to the big event—so don't neglect this important though tedious test flying.

Plane on the Cover

(*Continued from page* 19)

velopments that are even yet in progress. But V-J Day ended, at least for a lengthy time, Navy plans for quantity procurement of the airplane.

Original design of the XTB3F-1 featured a Pratt & Whitney *Double Wasp* reciprocating engine in the nose and a Westinghouse 19B axial-flow turbojet engine in the tail, a combination producing the equivalent of about 4000 hp. at maximum speed! An advanced model was projected with the more powerful Westinghouse 24C axial-flow turbojet engine in the tail, which would have produced about 5000 hp. from the combination.

But with the war over and the urgency of aircraft development substantially removed, the XTB3F project was slowed

almost to a halt while BuAer designers reconsidered the design in retrospect. First of all, what was the future need for the torpedo plane; that was a vital question war experience posed. True, countless successfull and unsuccessful torpedo plane attacks had been carried out in the Pacific, and hundred of crewmen had lost their lives in the operation together with tens of thousands of enemy soldiers and ship crews. But would a future war render such operations far more hazardous and, therefore, more unprofitable? Most Navy tacticians thought so, but many vehemently defended such tactics.

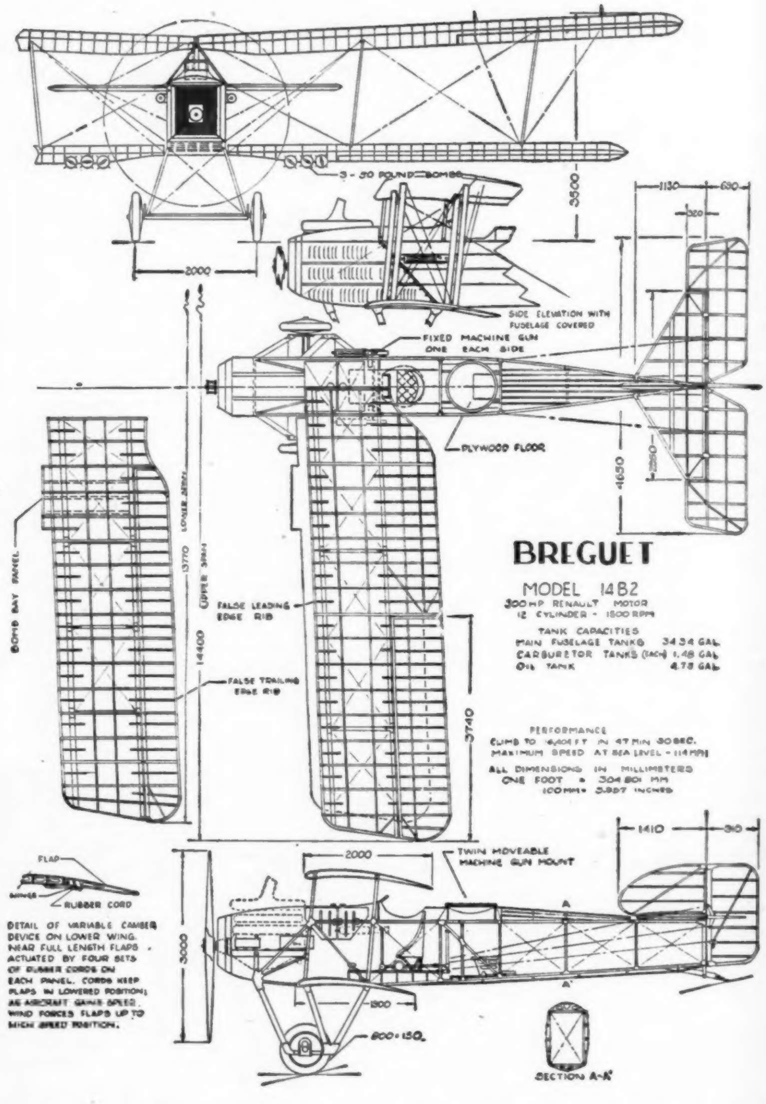
Looming in a future war was most certainly increased emphasis on the submarine, difficult to detect, deadly in action, comparatively easy and economical to build. Without carriers, with inferior surface warships but with numberless captured German documents, facilities and actual submarines, Navy strategists foresee heavy Russian reliance on this undersea menace in any future combat.

Coupled with this conclusion was the war records of the multi engined anti-submarine patrol planes: slow, expensive to build and costly to operate. All of these factors added up to a tentative conclusion: conversion of the Grumman design to a long range anti-submarine attack airplane. This design change immediately set engineers into action, and the "new" Grumman attack plane emerged. Gone was the fuel-eating jet engine with its inefficient long air intake ducts from the wing leading edge near the fuselage, and the equally long and inefficient tail pipe installation and in its place: fuel for the *Double Wasp* in the nose. Added: more and more submarine detection gear and all-weather equipment.

New though it is, the Grumman AF-1 incorporates several familiar Grumman practices forged in war and peace into standard Grumman configurations. First of these is the nose "down thrust" arrangement used on the famed F6F *Hellcat*. This consists of pitching the engine mount down in such a manner that the thrust axis of the airplane lies at an angle to the horizontal reference line. This system minimizes the often radical difference between the "power on" and "power off" conditions of the airplane and permits maximum efficiency in the cruising condition when the high attack angle of the wing necessitates pointing the airplane up at the nose. The engine axis, being pointed down, therefore lies approximately horizontal in the cruising condition.

Another Grumman device is the "nose flap" used on the new Grumman XF9F-2 *Panther* jet fighter. Purpose of this device is to increase the camber of the airfoil resulting in an increase in its lift, particularly in conjunction with the trailing edge flaps used. Advantage of the system is the fact that it provides, in effect, 2 separate airfoils for the airplane, one for high speed cruising flight (nose and trailing edge flaps up) and one for low speed landing (nose and trailing edge flaps extended). On the Grumman attack plane, this nose flap arrangement is only used over the outer part of the wing in the vicinity of the ailerons to provide good lateral control at slow speeds, where aileron control often becomes critical.

Another familiar Grumman device is the use of jet exhaust stacks, well known on the F6F *Hellcat*, F7F *Tigercat* and the F8F *Bearcat*. By bringing the individual exhaust stacks together in a series of "siamese" fixtures and exposing them to the slipstream in a recessed opening, as much as 8-10 mph can be added to the



airplane—at no additional cost in power! Oil cooler air is taken inboard from a lower segment of the engine cowl, passes through the oil cooler and exits through controlled flaps at the rear aft part of the powerplant section.

The pilot is located on the left side of the spacious canopy, and the radio-radar operator on the starboard side, slightly aft to provide room for his equipment in front of him. Special provisions for a navigator and even a fourth crew member can be provided aft of the flight deck if required.

Landing gear is conventional tractor type with main gear folding outboard into the wing lower surface, and the tail wheel folding aft into the lower rear fuselage. Standard deck arresting hook is mounted in the extreme tail and extends rearward and downward for carrier deck landings. Tail surfaces are conventional full cantilever design with fabric covered control surfaces. Experimental rudder installations are still undergoing flight tests to determine the exact amount of rudder area required for adequate control and ease of pilot handling. Spin investigations have shown the need for the addition of tiny metal strips below the after fuselage belly to disturb the lateral flow over the underside during a spin and to reduce the pressures in the area.

Because of its long range search mission, the Grumman attack is lightly armed with only two 20 mm cannon as standard fixed equipment. However, the big craft can take care of itself in an argument, with standard aircraft rockets plus a couple of monster "Tiny Tim" varieties useful for handling surface vessels. The long spacious bombay can house anything from 2000 lb. torpedoes to mines, depth charges, standard aircraft bombs or added fuel tanks, depending on the mission.

No superspeedster, the Grumman attack is still capable of gunning along at nearly 400 mph, but its chief asset is its long range ability, up to about 3500 miles in a pinch. It can operate at altitudes up near the 40,000 ft. level, and climbs at nearly 4000 feet per minute.

PHOTO CREDITS

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	Below	U. S. Navy Photo
19	*All*	Harold G. Martin

Flash News

(Continued from page 1)

peller shaft resulting in both increased power and reduced fuel consumption. Wright compound engine actually has 3 turbines geared back into the engine.

KEEP YOUR EYE on the war-winning B-29 *Superfortress.* Far from a "surplus" World War II type outmoded by later models, the B-29 is still the backbone of our USAF striking power. Boeing has re-opened its monster Wichita (Kans.) B-29 plant for a large project involving modifications to existing B-29, including those now being removed from long term storage at an ever growing rate. The current B-29 is a far better performer than its wartime version, believe it or not. This improved performance has been laboriously eked out by Strategic Air Command's Gen. George C. Kenney, who has trained his flight crews to extract the maximum from the airplane simply through proper use of its engine and equipment. Range of the airplane is now well over 4000 miles achieved through careful power settings and cruise control procedures.

CONVAIR'S FLYING AUTOMOBILE is doing just that again after recent crash necessitated complete rebuilding. Cause of crash: running out of fuel. The completely rebuilt design has completed several flights at hands of Test Pilot Bill Martin. The craft is a 4-passenger automobile with plastic body, hydraulic brakes, fluid drive, pneumatic shock absorbers and a 26-1/2 hp Crosley engine mounted in the rear (front hood contains baggage compartment). In addition, its wing assembly contains a 190 hp Lycoming engine for flight. Convair will continue test and development of the design before making a final decision on production and marketing.

PIPER AIRCRAFT CORP. is the latest personal aircraft manufacturer to enter the 4-place field with its *Family Cruiser* powered by a Lycoming 0-235-C1 engine of 115 hp. Of conventional Piper high wing monoplane design, the new craft is priced at $3825, lowest of any 4-place airplane on the market. Flap-equipped, the *Family Cruiser* lands at only 43 mph and cruises at 110 mph. Piper plans five-a-day production of the new 4-placer. Also in the 1948 Piper stable is the *Vagabond,* first side-by-side Piper since pre-war days. Giving 102 mph cruising speed and 300 mile range, the 2-placer is priced at only $1990, lowest cost airplane on the market. Rounding out the Piper offering for the year is the standard *Cub Special* at $2495 for the 65 hp version, and $2572 for the 90 hp model.

"STEVE" WITTMAN, who shares honors

with Art Chester as participant in every National Air Race since they started, is going stronger than ever with plans for a new racer for the 1948 classic. Designer and builder of the *Buster* midget racer, which won both Goodyear Trophy in Cleveland and Continental Motors Trophy in Miami, Wittman is paring down his design and the new craft will have a 15 ft. span and be powered by an 85 hp standard Continental engine.

U.S. AIRLINES ARE FLYING more plane miles per year than all the rest of the world combined, according to study by the Foreign Air Transport Division of CAB. Although its 6,686,000 plane miles figure is 59% of the world's total, this figure is actually declining steadily as new foreign carriers increase their route mileage. U.S. flew 64% of world's plane miles in fall, 1946 and 61% in the spring of 1947. These figures exclude Russia, of course, on which no data is available.

WRIGHT AERONAUTICAL CORP. received Air Force contract for test and development of the giant Menasco XJ-37 turbojet engine on which bids were received by Allison, Pratt & Whitney, General Electric, Packard and Fairchild. The engine is to become known as the Lockheed-Wright XJ-37 according to terms of the agreement. Reason for transfer of the project is the substantial outlay for testing facilities and equipment which would have been required of Menasco and which the company was unable to provide. Actually, the Air Forces have no immediate plans for production or flight test installation of the huge, 5000 lb. thrust engine. Wright is to test the turbine and make whatever changes or improvements are required to attain maximum power output and minimum fuel consumption.

FAIRCHILD Engine and Airplane Co. received an Air Force contract for construction of one XC-120 *Pack Plane*, a version of the C-119 Packet equipped with a detachable fuselage. The new plane will use only the 2 Pratt & Whitney R-4360 *Wasp Major* powerplant units, wings, booms and tail surfaces of the C-119 with the remainder entirely new design. Advantage of the pack plane arrangement is its great reduction in ground handling time permitting the craft to fly into an advanced base with ammunition and supplies, unhitch the container, attach a container with 36 litter patients and return quickly to the rear areas. The packs, containing 2900 cu. ft. of space and weighing up to 18,000 lbs., can be fitted as complete command radio stations, field headquarters, mess sections, flying surgical units, etc. Of considerable interest is the performance of the pack plane without its pack, its 3250 hp engines giving it fighter performance, and lightweight permitting maximum evasive maneuverability.

AIR FORCE ANNOUNCED its decision to lease Curtiss C-46F *Commando* transports to airlines at a flat rate of $300 per month. "Substantial numbers" are available, the Air Force said. Purpose of the lease offer is to alleviate both scheduled and non-scheduled cargo line equipment shortage. Air Force sees a potential military value to freight lines, which would develop operating techniques and experience invaluable in wartime. Leasing of Air Force planes is not new, numerous Douglas C-54 *Skymaster* transports having been leased to both certificated and non-certificated operators shortly after V-J Day.

HELICOPTER DESIGN continues to progress with the latest Sikorsky model a decided improvement over previous craft offered by the company. Delivered to the Navy as XHJS-1, the new Sikorsky is powered by a 500 hp *Continental* motor and has top speed of 110 mph. It can climb to 19,000 ft. and has 330 mile range. Designed for Navy shipboard use, it features a relocation of the tail anti-torque rotor from a position on the boom to a new, high position atop a cantilever shaft housing, to clear shipboard obstacles. The nose enclosure is revised and the landing gear strengthened for sea duty. It features all metal rotors which are longer lasting, stronger and give better aerodynamic per-

THE STREAK-125

One of the hottest private planes now being made, the STREAK-125, is the plane on the cover for July M.A.N. With a top speed of over 200 mph, the ship can carry its two occupants around in a real hurry, and the lines are such that it should make a beautiful model.

formance. The XHJS-1 is especially equipped for night operations, unlike earlier commercial designs.

HUGHES' FLYINGBOAT PROGRESS report: Hughes is settling down to what may prove to be the longest flight test program to which an airplane has ever been subjected. A new movable steel-frame shelter is being built at a cost of $120,000 to protect the monster craft at its Long Beach, Calif., harbor dock. The present steel-post-and-canvas structure protects only the outer wing panels and the horizontal stabilizer. The new shelter will cover the powerplants and fuselage of the craft with the structure sliding on rails to permit entrance and exit of the boat.

GOODYEAR AIRCRAFT CORP. is putting finishing touches on a Douglas DC-3 transport equipped with its famed "crosswind" landing gear, an exceptional engineering feat. The company is now manufacturing the landing gear commercially for personal aircraft installation. The gear permits an airplane to land in a crosswind, the airplane moving directly down the runway while yawed around into the wind. The castering mechanism is contained completely within the wheel hub, permitting its installation on any type landing gear strut without changes in the airplane or landing gear support design. A notched cam arrangement keeps the wheels from turning during taxiing or at low speeds.

THE FLEET OF 150 Curtiss C-46 *Commando* transports recently sold to the Chinese Government will be flight-delivered across the Pacific. Transocean Air Lines has signed contract with the Chinese Government to perform the ferrying job. The planes will be modified with extra fuel tanks to permit the crossing.

Design Forum

(*Continued from page 27*)

claims that a stabilizer with negative setting relative to the wing produces no resistance to displacement and provides no recovery forces when the airplane is displaced. As a reason for this he says that the elevator setting is a constant factor regardless of what the action of the stabilizer is.

Mr. McCombs appears to be in error in stating that the elevator setting is a constant factor when considering aerodynamic forces. True, it is a constant factor relative to the structure of the airplane, but the structure has no bearing on stability in itself. The effect of the elevator setting is most decidedly a variable factor in the problems of stability because here the relative wind must be considered and not the airplane structure. The setting changes in comparison to the relative wind as the airplane noses up or down.

Considering Fig. 1, we have a plane with +2 degrees wing incidence, the stabilizer also is set at +2 degrees. Now assume that the airplane starts to climb. During climb the angle of attack increases. This means that the airflow passes over the wing at a greater angle, for instance 5°. The air therefore will pass over the stabilizer at 5° also, provided the wing and stabilizer have the same airfoil section. The lift increase per square foot of area will be the same on both and will be in direct proportion to their areas, as indicated by L1, LS1 and L2, LS2. Consequently no resisting or recovery moments will result even though the lift on wing and stabilizer increases and the relation between the nosing over and nosing up moments will remain the same. When the airplane reaches a stalling point, both the wing and tail will stall simultaneously, producing no recovery forces. What the airplane does at this

particular point depends on other factors. Often it will flutter down or tail slide or perform some other maneuver that results in a crash.

Now if Mr. McCombs' statement is true, any other setting will also produce no recovery forces, with the same results. To see if this is so let us set the stabilizer at the angle of zero lift, instead of +2°. If Mr. McCombs' statement is accurate, the airplane will react the same to this setting of zero degrees as it would to the setting of 2° in respect to recovery. Fig. 2 illustrates this condition, showing lift forces on the wing and no forces on the stabilizer because it is set neutral to the line of flight. (It is assumed that the stabilizer is set at the angle of *zero lift.*) The center of weight of the airplane C.G. is slightly forward of the lift force on the wing in order to balance the resistance R acting above the thrust line T.L. Each of these forces produce equal and opposite turning moments. They are balanced so they need not be considered in our problem.

Suppose this airplane starts to climb; the lift on both the wing and stabilizer increases because the attack angle increases when climbing. However, the *percentage* of increase of lift on the stabilizer is much greater than the percentage of lift increase on the wing, because in normal flight no force acted on the stabilizer, while during climb there is a lift force which tends to nose down the airplane and prevent any increase in attack angle during climb. This is a nosing over moment that resists stalling tendency and is therefore a stabilizing influence. If the wing angle of attack is 2° in level flight and 5° when climbing, the lift increases from .445 at 2° to .68 at 5°. This is shown on the chart of a lift curve for typical cambered wing section, Fig. 4, and represents an increase of 53%.

Under the same conditions the attack angle of the stabilizer of this same airplane will increase 3° from level flight to climbing flight. If it is cambered and is set at a *lifting angle* of 2°, the attack angle for level flight is indicated on the chart *2° to the right* of where the lift curve intersects the zero lift line (horizontal). This indicates a stabilizer angle of —1° because positively cambered surfaces lift at negative angles, usually the zero lift angle is —3° or —4° depending on the camber. When climbing, the attack angle increases 3°, so the climbing stabilizer angle is +2°. The lift increases from .2 to .445, which is an increase of about 150%. This is more than twice the percentage increase of the wing lift and produces a large increase in the nosing down moment that tends to return the plane to normal level flight. The angle of climb will be that angle at which the restoring moments are balanced by the nosing up moments. The latter are commonly generated by the couple between the drag R and the propeller thrust T.L., Fig. 2.

Let us go a little further. Suppose the climb angle increases until the airplane reaches the stalling angle. That is, the wing angle of attack becomes 15° or 16°, Fig. 3. This is approximately the angle at which the average wing stalls. At this angle the lift on the wing drops off suddenly. However, the stabilizer passes through the air at an attack angle of only 13° or 14°, 2° less than the wing. Therefore it has not reached the stalling point but is still producing high lift as indicated in the graph.

So we have a condition at the stalling point where there is a strong nosing over couple due to the lift on the stabilizer and

very little if any lift on the wing to support the forward part of the airplane. The nosing over couple therefore becomes the force on the stabilizer times the distance M between the stabilizer and the center of weight C.G.; there is no resisting couple, only this corrective couple. The result therefore is that the airplane noses down sharply out of the stall, resulting eventually in a recovery to normal flight position.

This difference in stabilizing setting creates a difference in the airplane's stability characteristic. In fact this principle of a stabilizer set negative to the wing has been the means of obtaining longitudinal stability for the past 70 years. There is not an airplane built which does not depend on this feature for longitudinal stability to some extent. Any theory indicating that this is not true obviously is in error, or at least its application to practice is in error.

A stabilizer negative to the wing is also the means of obtaining various degrees of nosing up effects. For any given flight speed the nosing up effect increases with the negative setting of stabilizer relative to wing. If the stabilizer is set at —4° to the wing and —2° of lift to the line of flight, there will be a down pressure on the stabilizer during normal flight. If the flight speed is increased the plane will nose up sharply, because down pressure on the stabilizer increases with speed. The greater the negative setting the larger the downward pressure. Consequently the nosing up effect will be greater than it is when the stabilizer is set at zero degrees to the wing as in Fig. 1. In the latter case there is no nosing up effect due to the stabilizer, whether the plane is in normal flight or climbing, because there is no change in the *relationship* between the intensity of the lift force on the wing and the force on the stabilizer.

Mr. McCombs also writes: "My final point of argument concerns this business of lifting stabilizer. Any stabilizer flat or cambered may or may not be a lifting stabilizer. It merely depends on how the model is trimmed."

In this statement Mr. McCombs is absolutely accurate and expresses the opinion that has been upheld so many times in this column. A stabilizer is said to be lifting when it is set at a positive lift angle relative to thrust line, when measuring this angle between the line of zero lift of the stabilizer and the thrust line. In cambered stabilizers the line of zero lift forms a positive angle with the chord of the section used. Therefore a cambered stabilizer may be set at zero degrees of even at a minus degree to the thrust line and still be a lifting stabilizer, because the line of zero lift is positive to the thrust line as in Fig. 5.

If a uniform section (cambered equally on top and bottom surfaces) is used, the stabilizer still can be a lifting section provided its setting is positive to the thrust line. Lifting stabilizers give better results than non-lifting stabilizers on duration models and should be used wherever possible. During flight they actually carry part of the load and make the model more buoyant, thereby increasing the rate of climb. They also produce a flight trim that results in a larger attack angle during glide than during power-on flight. In this way the plane may be trimmed to climb at 4° and glide at an angle of 6° or 7° which usually provides the lowest sinking velocity. This means that the airplane settles slowly and remains in the air longer.

* *

Arthur Davis of Greenfield, Mass., is building a ship powered with a .099 cu. in. displacement engine and he is doubtful concerning the proper size and weight of the plane in which he intends to mount it. Those who have read the new rules will realize that the design for last year's ships must be modified in respect to their weight for any given engine and in respect to their wing area if they are to obtain maximum performance.

A simple procedure is to determine the required weight and wing area of a plane designed according to the old rules. Such a ship must weigh not less than 8 oz. when powered with a .099 engine. The wing area must be not greater than 114 sq. in. This gives the proper weight relative to power, and area relative to weight. In other words, the correct power and weight loading. Your 1948 contest plane must weight 25% more; that is, 10 oz. instead of 8 oz. There is no limit to the wing area you may use because there are no wing loading limits. However, the rules specify that the maximum official duration may be only 10 min.; all time above this duration is not counted. In order to provide your ship with this maximum duration of 10 min. the wing area must be at least 150% greater than wing area specified by the old rules. In other words, under the 1948 rules a plane powered with a .099 engine should have 285 sq. in. wing area in order to give maximum performance.

* *

S. E. Smith, Jr., writes us from Lawrence, Kans., as follows: "I have just finished reading your 'Design Forum' column in the March issue and feel obliged to call you to task for the statement you made regarding the angular settings of wings and tails, particularly in regard to low wings.

"I thought the fact was rather widely accepted that model wings are most efficient at high angles of attack (6°-8°) because of the low Reynolds Number of model aircraft. Thus, by mounting a model wing at approximately 6° the model can be made to *glide* along a line very nearly parallel to its fuselage centerline, presenting the least possible frontal area to the relative wind in the glide. A model with its wing set at a low incidence angle will glide with the relative wind striking the model slightly from below in order to get the required angle of attack on the wing."

Mr. Smith has evidently misunderstood what we have been trying to say. What he states concerning the high attack angles for *gliding* is correct because the sinking velocity of a model is minimum when the wing is flying at angles varying between 4° and 8°. However, angles specified in the March article were the correct wing settings *when referred to the line of thrust.* This line is the basic reference line to be used in all such cases, not the fuselage axis as mentioned previously.

The best setting for a duration model where the wing is parasolled is from 3° to 4° relative to thrust line. The stabilizer then may be set from +½° to +1½°. These settings are established relative to thrust line because *the thrust line is the factor that is important in climbing.* To obtain the most efficient and fastest climb the surfaces should be the settings given here. However in order to obtain *maximum glide, the fuselage* should be so arranged relative to wing and stabilizer that its axis is approximately 6° negative to the wing chord. So we have a condition where *in the climb* the wing is approximately 3° to *thrust line,* and when gliding

at its angle of minimum sinking velocity of 6°, *the fuselage axis*, is about 6° to the wing chord and will be parallel to the airflow. The angle of 3° relative to thrust line is established for climb because during climb the wing is flying at an angle of approximately 4° to the relative wind. 4° with most airfoils is the angle of *maximum flight efficiency* in respect to speed and lift because the *lift is maximum* and the *drag is minimum.*

Mr. Smith also writes: "I am particularly at odds with your low wing setup shown in Fig. 3 where you have the wing at zero and the tail at minus three. Here is your design as I see it: You have taken a model with a low center of resistance and placed a high thrust line on it, developing a serious nose-down moment under power. Now, you offset that moment by a negative tail setting. The negative tail, in turn, demands a zero wing setting; certainly an inefficient setup. When the power quits on this model it will certainly stall, and the glide will be quite 'mushy' due to the zero wing setting."

Mr. Smith describes the setup accurately but we differ with him regarding the proper way to set the wings and stabilizer of a low wing of this type. We do not say, however, that this is the most efficient setup for duration because it is not. What we do say is that when a plane is arranged with thrust line high and c.g. low, regardless of the position or angle of the fuselage, that the wing should be set at zero to +1°, and the tail at minus 3° to minus 1°, depending on the length of the fuselage, size of the tail, etc. These settings were not selected at random but are the result of experiments with low wing planes since 1920. Hundreds of tests were made and it was found that when wings were set at +2° or 3°, with thrust line very high, there would be a decided stalling moment at the end of flight. This is due to the fact that the wing must be placed quite far forward relative to c.g. in order to overcome the nosing over moment produced by the thrust line located above the line of resistance.

We believe Mr. Smith is confusing our statement concerning the *high thrust line* and low wing, with *high fuselage* and low wing. It is a question of what is meant by low wing; low relative to thrust line, or low relative to the fuselage. *Aerodynamically* speaking, the plane is a low wing when the wing is below the thrust line a distance sufficient to locate the line of resistance below the thrust line. From the *structural* standpoint, a model with the wing at the lower edge of the fuselage and with the thrust line on a level with the wing center is a *low wing*. Aerodynamically *this is not a low wing* because the thrust line is *below the line of resistance*, especially so if the wing has a large dihedral. In such case it is best to refer to the diagram in Fig. 3 of the March issue and determine where the wing is located relative to the thrust line. The diagram then will give the correct wing and stabilizer setting. The setting, in a case where the thrust line is approximately at wing center, would be +2° or 2½° for the wing and zero for the stabilizer.

Next month other important questions will be discussed. Send all questions and designs to "Design Forum," c/o MODEL AIRPLANE NEWS, 551 5th Ave., New York 7, N. Y.

CORRECTION

In the left hand column of chart on page 29, May issue, the figure "90" should be "100", and "100" should be changed to "120".

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No responsibility assumed for any omission or error.

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